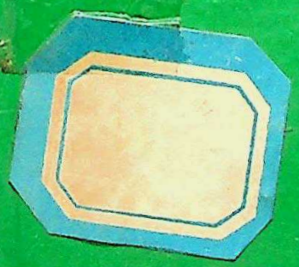
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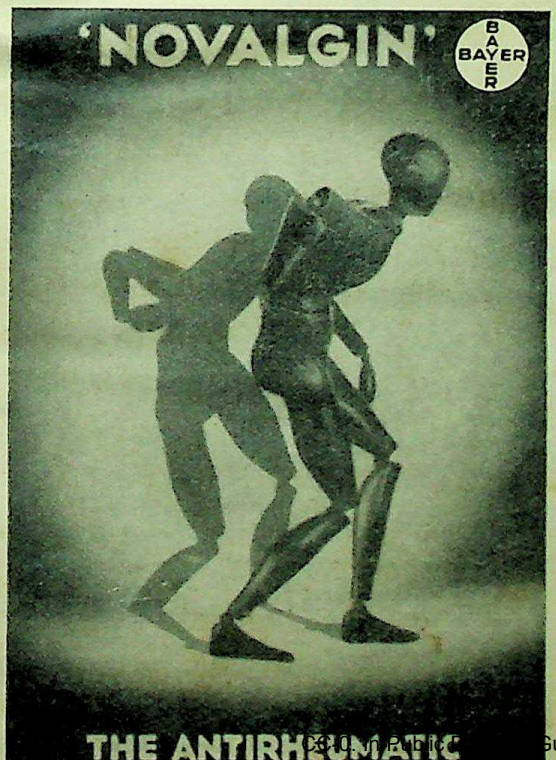
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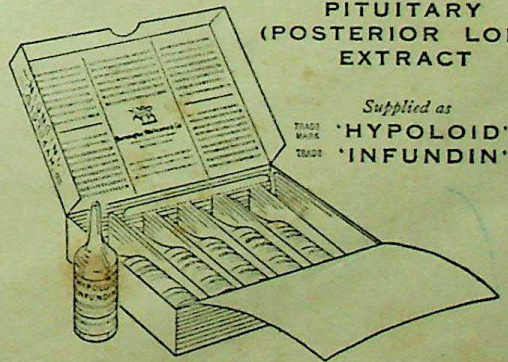


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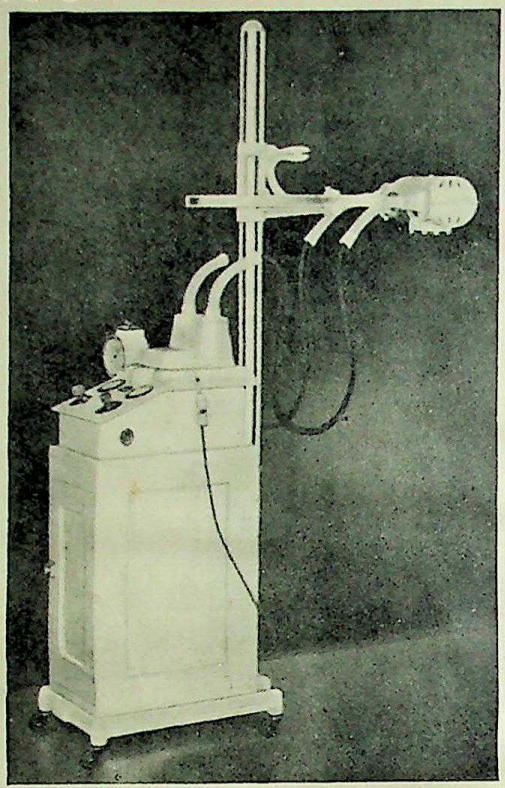
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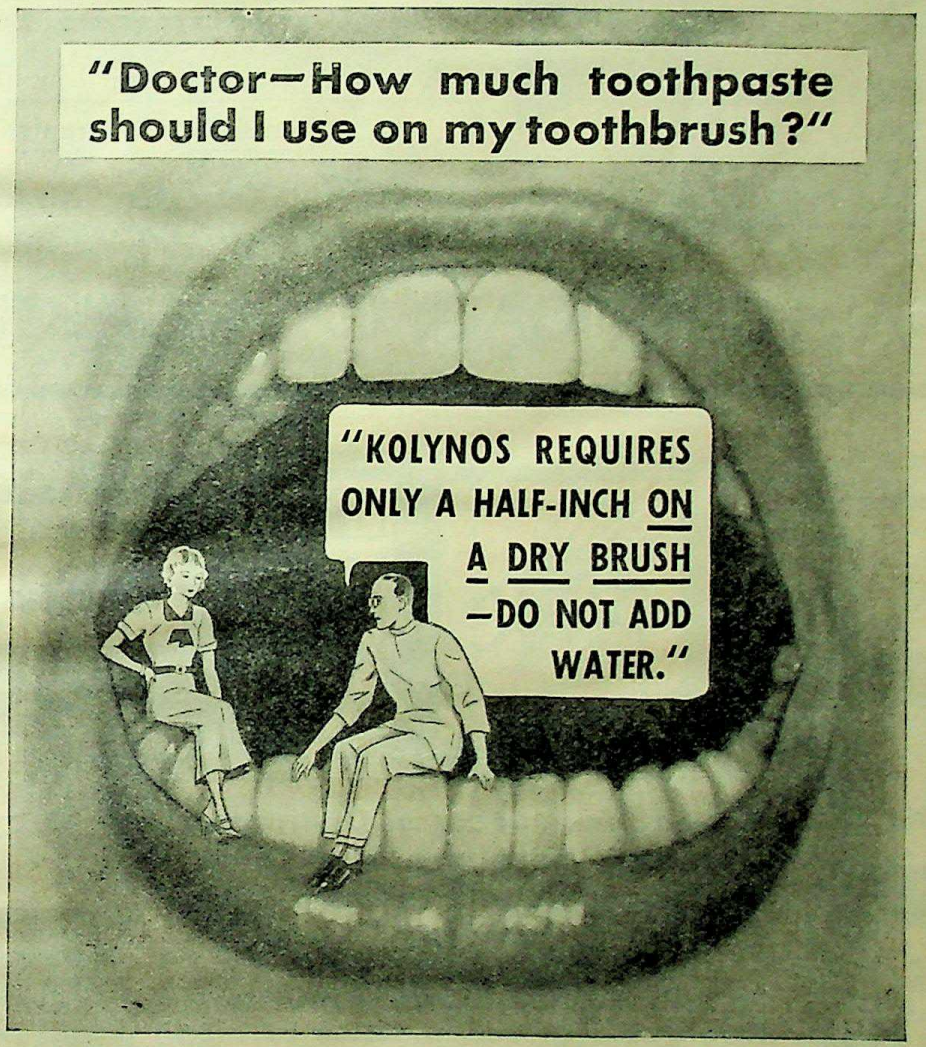
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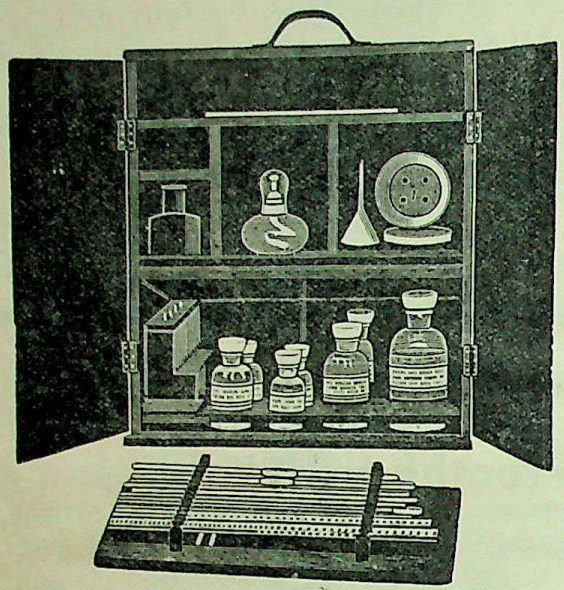
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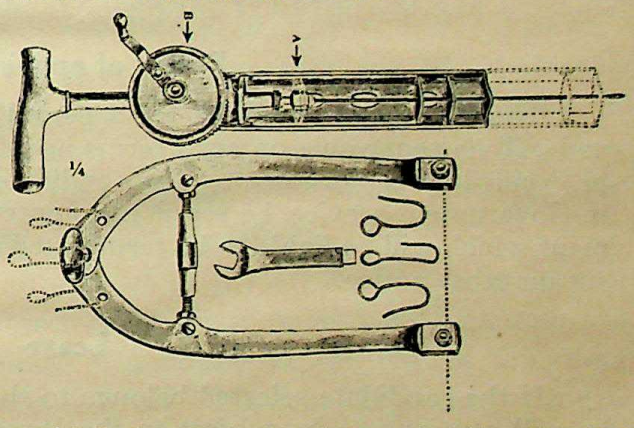


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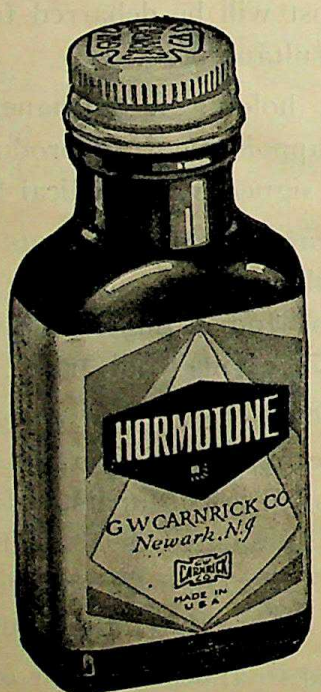
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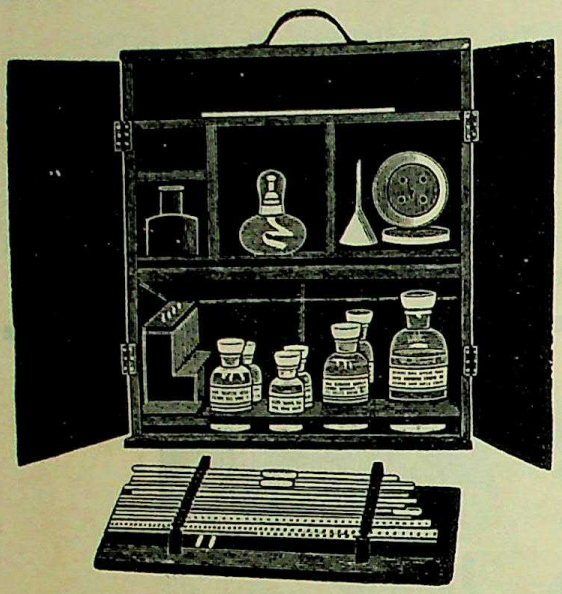
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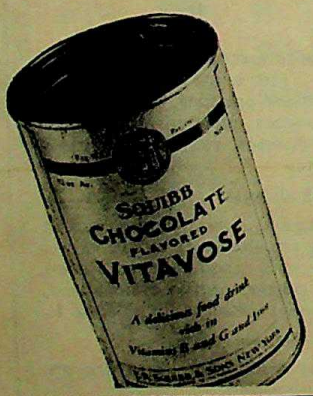
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Original Articles

ELECTROCARDIOGRAPHIC CHANGES IN EPIDEMIC DROPSY

By R. N. CHOPRA, C.I.E., M.A., M.D. (Cantab.), M.R.C.P. (Lond.)
BREVET-COLONEL, I.M.S.
Honorary Physician to H. M. The King
R. N. CHAUDHURI, M.B.
and
N. DE, M.B.
(*From the Department of Pharmacology, School of Tropical Medicine, Calcutta*)

THE condition of the heart in epidemic dropsy has received considerable attention from clinicians during the last decade. A perusal of the large amount of literature which has accumulated on the subject shows that the studies were chiefly limited to investigations of the subjective and objective manifestations in the patient. Little attention has so far been paid to a systematic investigation of the electrocardiographic changes. As it has been definitely shown that electrical changes in the heart give early and reliable evidence of cardiac damage, electrocardiography, as a routine investigation in all cases of epidemic dropsy admitted to the Carmichael Hospital for Tropical Diseases, was instituted. The following observations are based on a study of the electrocardiograms of 50 such cases. Patients who gave a history of previous cardiac disease or who showed old-standing organic lesions were excluded from this group.

Analysis of cases

I. Rate of the heart.—There was some degree of tachycardia in about 90 per cent of cases. A slight degree of tachycardia (heart rate between 81 and 99) was observed in 15 cases, moderate tachycardia (rate between 100 and 115) in 21 cases and severe tachycardia (rate of 120 or more) in nine cases. The highest rate of heart beat recorded in this series was 136 per minute. In only five patients was the pulse rate 80 or below.

II. Rhythm.—The rhythm was practically regular in 42 cases. A moderate degree of sinus irregularity was observed in five patients. In this condition the rhythm varied in regular cycles and each cycle showed a progressive lengthening of the interval between beats followed by a progressive shortening. The P—R interval remained constant while the T—P interval showed variation in length. In two patients the regular rhythm was interrupted by the occurrence of extra systoles, auricular in one case, and nodal in the other. In one patient, auricular fibrillation with a moderate degree of tachycardia was observed.

III. P wave (the auricular deflection).—The normal characters of the P wave are as follows :—

Height in largest lead—1 to 2 mm.; direction in leads I and II—upward; direction in lead III—upward, diphasic or downward; form—rounded, may be notched; duration—not more than 0.1 second. In the records where one lead is biphasic or iso-electric and the amplitude in other leads about equal, the normal values for P vary from 0.9 mm. to 1.8 mm.

In the present series of patients, the height of the P wave was within normal limits in 38 cases. In three patients it was below normal, indicating a poor functional condition of the auricular muscle or a poor state of nutrition; in eight patients the voltage was above normal, indicating a hypertrophy or an overactivity of the auricles. The direction of the P wave was upright in the first two leads in all cases except in the case where there was auricular fibrillation. The P wave, in the third lead, was iso-electric in three cases and inverted in three cases. The duration of P was within normal limits in 49 out of 50 cases, the remaining one being a case of auricular fibrillation. In four cases, a notching of the P wave was noticeable. This is probably not to be considered pathological as, according to Pardee (1933), notching may be a normal variation of the P wave. The opinion of Pardee on this point may be cited in this connection : 'The normal P is composed of overlapping of two electrical effects, one of which is due to each auricle. In the majority they fall so close to each other that no notching occurs. Occasionally the path of contraction in one auricle from the sino-auricular node to the tip of the apex or the base of the auricle may be larger than usual, so that the potential on that side will be slightly delayed in reaching its height. Thus, the peaks of the two electrical effects might not coincide closely, and a notching of P results'.

IV. P—R interval (auriculo-ventricular conduction time).—The normal limits of this interval are from 0.12 second to 0.2 second.

In 29 patients, the P—R interval was within normal limits. In 20 patients, it was found to be 0.10 second, *i.e.*, below normal. In the remaining case, the P—R interval was 0.12 second in the first record but was changed to 0.10 second in the second record. The change in rate was but slight, 125 to 130 per minute in this case, and there was evidence of a nodal extra-systole.

V. Q R S waves (initial ventricular deflection).—A summary of the limits of normal Q R S is given below :—

Height in the largest lead—7 to 17 mm.; direction in leads I, II and III—chiefly upward (R), either Q or S may be present singly, but neither as large as R; form—one, two or three sharply pointed peaks or vibratory groups;

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duration—not more than 0.1 second. If the record in one lead is diphasic, the amplitude in the other two leads is about equal; normal values of the height of Q R S may vary from 6 mm. to 15 mm.

Judged by the above standards, the height of Q R S, in the leads showing the maximum excursion, was normal in 32 cases. It was less than normal in two cases, one of which was a case of auricular fibrillation. This low voltage (associated in these two cases with a maximum voltage of T less than normal) indicates a weak physiological activity of the ventricles. In 15 cases the height of Q R S was above normal limits. This, in the absence of bundle branch block or abnormal degree of notching, would signify a physiological hyperactivity of muscle. In one case, the voltage was normal in the first tracing and was higher than normal in the second taken after a few days of treatment.

The direction of Q R S in the different leads was normal in 42 cases. In three cases, there was right ventricular preponderance, as indicated by the initial ventricular complex being directed chiefly downward in lead I and upward in lead III.

VI. S—T segment.—This was normal (iso-electric or very slightly above or below the iso-electric line) in 48 cases. Coronary T wave was seen in two cases. The characteristic feature of coronary T wave, according to Pardee, is an upward convexity of the S—T segment which carries the record at first slightly above the point of origin and then downward to form an inverted T wave. It indicates a localized myocardial degenerative process which is no longer in an acute stage.

VII. T wave (the terminal ventricular deflection).—The characteristics of the normal T wave are :—

Height in the largest lead—1.5 to 5 mm.; direction in leads I and II—upward; direction in lead III—upward, biphasic or downward; form—peaked. In those electrocardiograms where one lead is biphasic or iso-electric the height of T in the lead where it shows maximum excursion varies from 1.3 mm. to 4.5 mm.

The height of T was found to be within normal limits in 38 cases, and in 12 cases it was below normal. This may be due to (*i*) poor state of myocardial nutrition, (*ii*) decreased strength of ventricular contraction, or (*iii*) diffuse disease of the myocardium.

The direction of the T wave was upward in all leads in 21 cases. T_1 was iso-electric in one case and biphasic in one case. T_2 and T_3 were inverted in one case; T_2 and T_3 were iso-electric in one case; T_2 iso-electric with T_3 inverted in one case; T_2 biphasic with T_3 inverted in one case and T_2 biphasic in one case. Associated with upright T in the other two leads inversion of T_3 was present in 13 cases, a biphasic T_3 in one case and an iso-electric T_3 in seven cases. In one patient, T_3 was biphasic in the first tracing but inverted in the later records.

The form of the T wave was normal in all the cases in which it was upright.

Discussion.—From an analysis of the data at our disposal, we are forced to the conclusion that a functional derangement of the heart is the most common feature in epidemic dropsy. Tachycardia of a moderate degree is common and is usually associated with a shortening of the T—P interval. An interesting finding, present in nearly 40 per cent of the cases, is an abnormally short P—R interval (0.1 second only). This abnormally short P—R interval does not seem to be dependent on the rate of the heart, as it has been found associated with a heart rate of 70 as well as with a heart rate of 136. An abnormally short P—R interval is generally considered characteristic of nodal rhythm (nodal rhythm type I of Cowan and Ritchie, 1935) with a slow rate or nodal tachycardia with a rapid heart rate. Electrocardiographic changes of this type are typical of nodal rhythm but there are a few points which have to be considered before a final opinion can be offered. The P wave is usually found to be inverted in nodal rhythm; in the cases under consideration, the P wave is upright in the first two leads. In three out of the 20 cases with an abnormally short P—R interval, there was definite sinus arhythmia. Sinus arhythmia is very seldom associated with nodal rhythm. This fact, taken in conjunction with the contour and direction of the P wave, makes it difficult for us to conclude that the cases are genuine cases of nodal rhythm. The P wave is probably originating from the S—A node. One school of cardiologists thinks that a P wave, which is upright in the first two leads and precedes the Q R S complex, has its origin at the A—V node. As this is a debatable point, we will leave it as an open question.

It will thus be seen that epidemic dropsy produces sinus tachycardia. The rhythm has been found to be generally regular. The occurrence of extra-systoles (auricular in one, and nodal in another) supports the supposition that in epidemic dropsy there is increased excitability of parts of the heart other than the sino-auricular node. As regards auricular activity, this is found to be normal in most cases (38 out of 50). In three cases (6 per cent) the height of the P wave is above normal limits, indicating an increase in the muscular activity of the auricles, and in three cases a subnormal height of P indicates depressed activity. It is probable that, in the case where this height of P is above normal limits, there is an enlargement (dilatation with hypertrophy) of the auricles.

Ventricular activity as judged from the height and contour of Q R S is normal in 32 out of 50 cases. But in 15 cases (30 per cent) the higher voltage points to an increase in the

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irritability of the muscle. Enlargement of the heart is frequently seen in epidemic dropsy, as has been already pointed out by Chopra and Basu (1930).

That organic changes, most probably of the nature of degeneration, may be produced in the heart by epidemic dropsy, is seen from the occurrence of auricular fibrillation in one case and the 'coronary T wave' in two cases. Abnormalities of the T wave, especially in the leads I and II and in the voltage of largest T, are suggestive of myocardial damage due possibly to accumulation of fluid between the individual fibres.

In 12 cases the height of the largest T wave was found to be abnormally small. In two cases this low voltage of T was associated with Q R S of abnormally low voltage, indicating a weak functional activity of the ventricles. Of the remaining 10 cases, one was associated with Q R S of abnormal height and the rest were associated with Q R S of normal height. Roughly speaking, the voltage of T is normally about 1/5 to 1/4 that of R, and ranges from 0.2 to 0.5 millivolt. In all the leads the T wave follows the amplitude changes of R. When these relations do not obtain, a suspicion of myocardial derangement exists. This change is not severe enough to incapacitate the patient seriously but it is rare to find a small T wave with large Q R S excursion from a heart with normal reserve power.

Summary

(1) A critical study of electrocardiograms taken in a series of 50 inpatients of the Carmichael Hospital for Tropical Diseases suffering from epidemic dropsy is reported.

(2) In epidemic dropsy, functional disorder of the heart is very common. Sinus tachycardia and sinus arhythmia are frequently met with. Extra-systoles sometimes occur.

(3) The P—R interval is found abnormally short in a fair proportion of cases.

(4) There is evidence of increased auricular activity in a very small proportion of the cases, which probably indicates enlargement of the auricles.

(5) The occurrence of auricular fibrillation, coronary T wave and other abnormalities of the T wave are suggestive of myocardial damage, probably degeneration.

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CLINICAL STUDY OF SIXTY-THREE CASES OF ORIENTAL SORE

By J. GOODALL

CAPTAIN, I.M.S.

Chittagong

OWING to the earthquake which took place in Quetta on 30th May, 1935, it was found necessary to send two companies of K. G. O. (Bengal) Sappers and Miners to the scene of the catastrophe. These men were employed in work of salvage, and removal of dead and wounded. There were about five hundred and fifty men, and three or four officers, all of whom were physically fit at the time of arrival in the area. The vast majority of these men set off from Roorkee, in the United Provinces, on 1st June, 1935, and returned in November of the same year. They were a mixed collection of men, some Sikhs, some Hindus and some Mohammedans, with a few European sergeants and officers.

They provided the writer, after their return, with an excellent opportunity of studying the course, treatment, and general clinical picture of oriental sore. Approximately 11.8 per cent of them including one European sergeant and one officer developed sores in Quetta or at varying periods afterwards, on arrival back in Roorkee. Their average age was twenty-six years. Practically all the men said that the flies had been numerous and they had been bitten badly on their faces, arms, and legs. The more educated remarked that 'the ones which bit were sandflies'.

Symptoms

The sores appeared first as small red papules which gradually increased in size and finally, after a varying period of months, turned bluish in colour, softened in the centre, broke down and ulcerated. There was no associated pain, and no itchiness. In the case of the Indian troops, the majority of these sores became secondarily infected. They thought nothing of rubbing grass, leaves, or cowdung into their sores as soon as they were out of hospital. When this occurred the sores became painful, the surrounding tissues much swollen and pus formed.

The number of sores on one man varied from one to seventeen, but single sores were uncommon and a typical case usually presented not less than three nor more than eight.

Laboratory examinations

Every case of suspected oriental sore was examined for *Leishmania tropica.* In the sixty-three cases treated thirty-six showed Leishman-Donovan bodies. These bodies were not always identical in shape; there was the round or oval thick type to which the majority belonged, and the flattened type, the ends of which were almost pointed. They were very numerous in

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the large endothelial cells. In spite of careful study, no bodies were ever seen in peripheral blood films.

The specimens were obtained by undermining the margins of the sores with either an ordinary hypodermic needle, or a fine glass pipette, the point being directed towards the healthy tissue. It was very unusual to obtain positive results from tissue which was heavily secondarily infected. The most satisfactory from this point of view were the small early sores before they had broken down. As a rule these were literally swarming with leishmania. Leishman's stain was commonly used, but Giemsa's was also employed and found very satisfactory.

Blood.—This was fully examined in about fifteen cases. The red corpuscles were present in normal numbers and showed no abnormality. The hæmoglobin was normal.

The white corpuscles showed a constant slight increase, eight to eleven thousand per c.mm.

The differential counts revealed in every case an eosinophilia, of from four to fourteen per cent. There was an increase in the number of small lymphocytes on an average of 6 per cent. The large lymphocytes and monocytes, counted together, on an average were 8 per cent above the normal, a typical count being as follows :—

Polymorphonuclears (neutrophil) ..	50
Small lymphocytes	23
Large lymphocytes and monocytes ..	17
Polymorphonuclears (eosinophil) ..	10

The aldehyde test was carried out on six cases with a negative result.

Wassermann reaction carried out on two very chronic cases was negative.

Treatment

As numbers of cases of oriental sore began to appear at the Indian Military Hospital, Roorkee, for treatment, and as the sores did not improve at once, records of the different drugs used were kept for comparison. The number of patients soon became so large that special days and times had to be allotted for their attendance and careful notes kept of each case. It must be made clear, however, that no startling results nor rapid cures have been obtained. The following records of treatment are offered as showing the effects of the different drugs, antimony, emetine and orisol, on patients of the same type, and infected under the same conditions. It is, in other words, a fair test of the respective merits of these drugs.

Neostibosan was also used but only in one case, for reasons of economy.

The treatment consisted of two distinct kinds :—

(*a*) Specific treatment and (*b*) local treatment, the two always being administered in conjunction with each other. At first potassium antimony tartrate alone was used. Later, emetine, orisol and finally neostibosan were tried. Reference was made to the reports of Varma (1927) and Das Gupta (1930) and the original technique was altered slightly to comply with their methods. This made no material difference to the results obtained.

Local treatment

The majority of cases were treated with dressings of gauze soaked in normal saline, the wound having been previously cleaned with spirit. Finally, a bandage was applied. This dressing was changed twice a day, outdoor patients attending in the morning and evening. Septic cases were sometimes fomented with magnesium sulphate or boric acid. At times the dressings were soaked in hypertonic saline but this made no appreciable difference. Iodine was painted over the healing areas in several cases and was found very successful, but this was only used when definite signs of healing had been seen.

Specific treatment

Potassium antimony tartrate.—This was used in varying strengths which can be seen on reference to the table. For a soldier of average weight and in good health, apart from the sores, the most effective dosage was as follows: A preliminary dose of gr. ½ potassium antimony tartrate in 5 c.cm. sterile freshly-prepared distilled water was given intravenously, and this was followed three days later by a dose of gr. 1 in 5 c.cm. of the same solvent. Thereafter twice-weekly doses of gr. 1½ were injected until the end of a month, when the patient was given a rest for one week. Then the injections were resumed until definite signs of healing were well established. Local treatment was rigidly carried out throughout.

At one time gr. 2 of potassium antimony tartrate were given twice weekly, but this produced

---

EXPLANATION OF PLATE I

Fig. 1.—Case 7 (*see* table). Photograph taken four weeks after commencement of treatment. Sores were secondarily infected and the treatment lasted ninety days before a cure resulted. Patient frequently interfered with his treatment and rubbed filth into his sores. Treatment consisted of sixteen injections of potassium antimony tartrate and three of emetine with local application of normal saline.

Fig. 2.—Same case one month later.

Fig. 3.—Condition on discharge.

Fig. 4.—Early untreated case of oriental sore. Note the spread-out nature of the lesions which are not so typical as the lesions shown in the other photographs.

Fig. 5.—Case 29. Photograph taken three weeks after commencement of treatment. Shows two sores—one on face and one wrist. This case which was positive for *Leishmania tropica* was cured after two months' treatment with antimony and orisol.

Fig. 6.—Case 40. Photograph taken 14 days after commencement of treatment. Shows two lesions—one on face and one on wrist. The one on the face is a typical early sore. It was found to contain numerous *Leishmania tropica* (*see* table).

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PLATE I

Cases illustrating progress and results of treatment

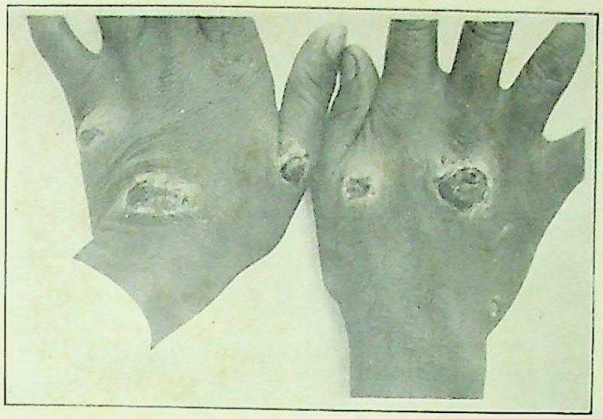


Fig. 1.

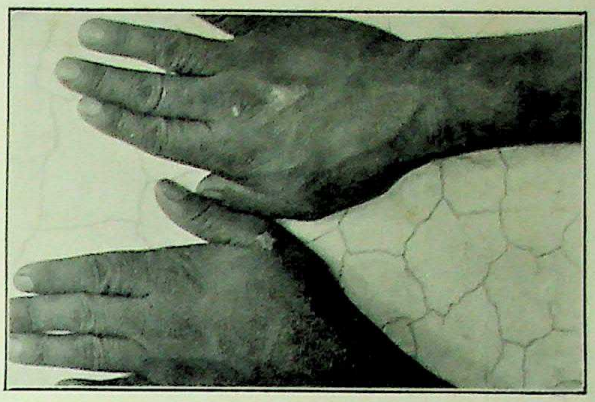


Fig. 2.

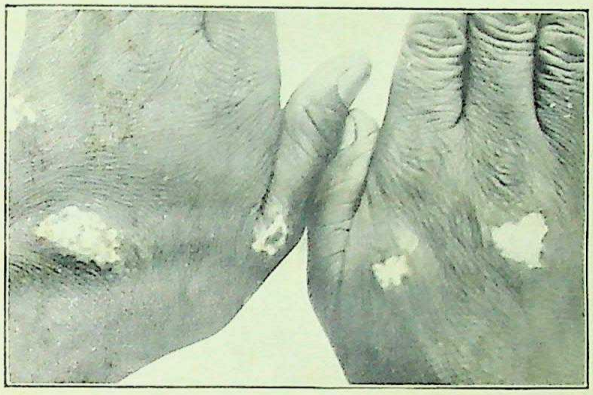


Fig. 3.

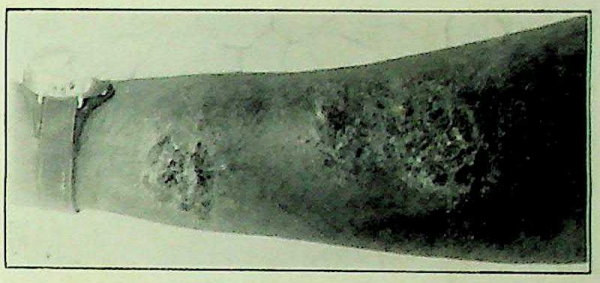


Fig. 4.

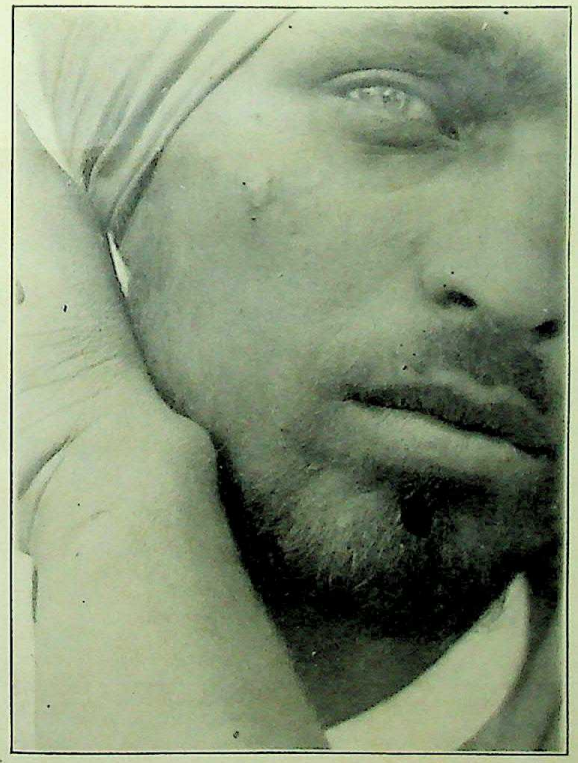


Fig. 5.

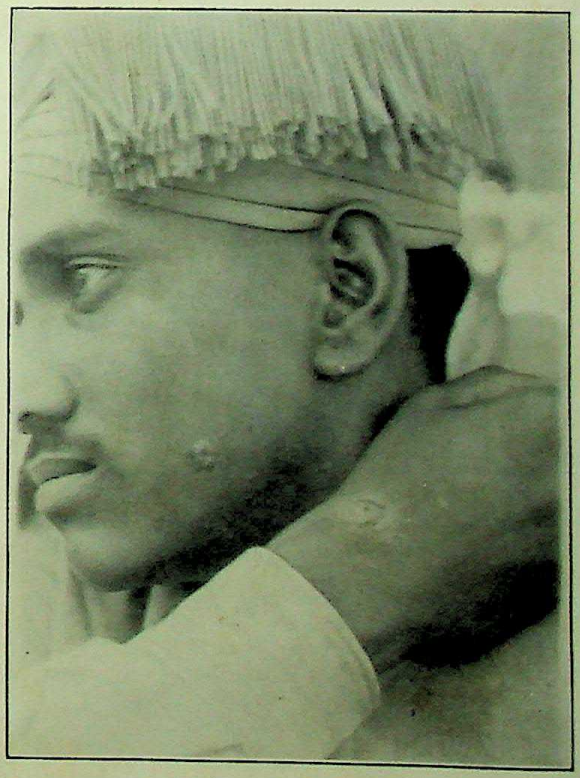


Fig. 6.

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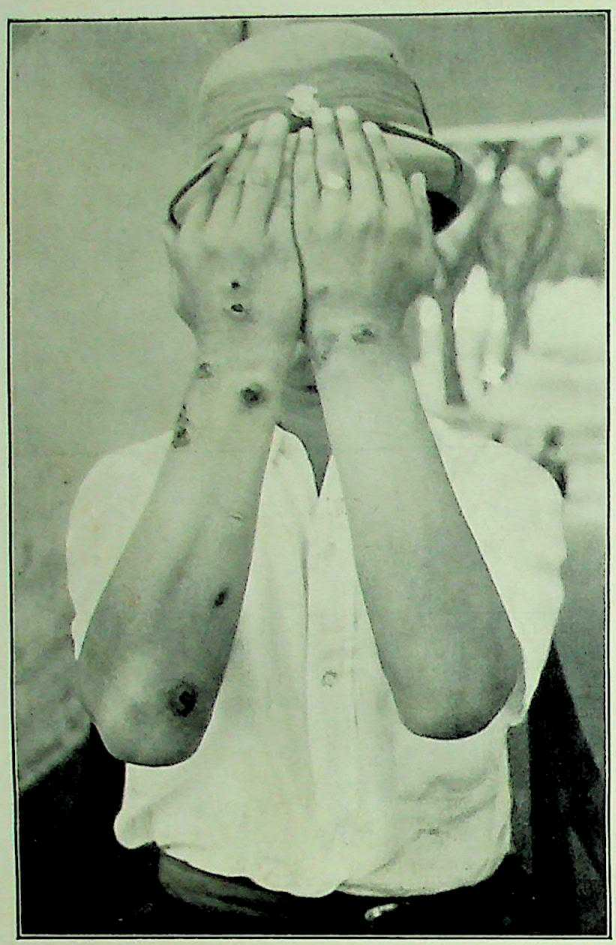


Fig. 7

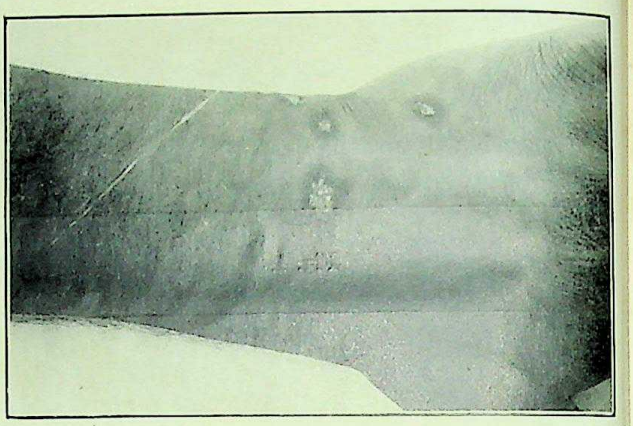


Fig. 8.

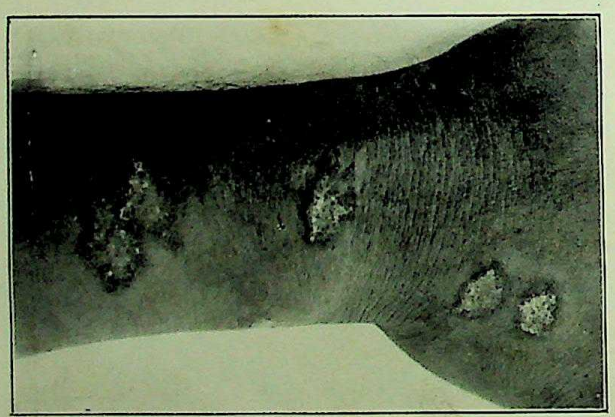


Fig. 9.



Fig. 10.

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toxic symptoms, *i.e.*, coughing, burning sensation in the throat, nausea and vomiting. Two men actually coughed up a little blood. Thus, although this treatment did seem to hasten the rate of healing, it was too dangerous to continue. The men were always excused duty on the days on which they attended for treatment.

The time taken for cases to heal varied tremendously. Some healed up rapidly after three or four grains with the addition of the local treatment, others required more than eighteen grains. The chronic cases were all secondarily infected. The first signs of healing were usually a drying up of the moist lesion followed by the formation of a hard crust which later peeled off leaving a white scaly and often itchy area. In addition the removal of the crust usually left a hollow behind and the ulcers eventually healed leaving marked scarring. Several men among the number sent to Quetta had suffered from oriental sore before but none of these became infected a second time.

Emetine hydrochloride.—Only one cure was obtained by using this drug alone in conjunction with local treatment. A reference to the table will show that twenty cases were treated with it, but, although some improvement was noted at the time, this improvement was only temporary.

The usual dosage was gr. ½ emetine hydrochloride in 3 c.cm. sterile distilled water for one large sore. This was repeated once a week. Some patients were given as much as gr. 2 at a time according to the number of sores treated. The drug was administered by injection into the edge of the sores and the surrounding tissues, the first signs of healing being the creeping in of the ulcer margin. Many cases, however, showed a false improvement. The margin of apparently healthy tissue crept in but later on turned a bluish colour, softened and ulcerated again. It was noted in treating cases with emetine that, unless the limb on which the ulcer being treated was placed on a firm support, the patient was apt suddenly to move it, jerking the needle out, so that a stream of emetine was directed upwards, more often than not into the doctor's eye. This resulted later in a painful conjunctivitis. Used in conjunction with antimony in certain chronic cases it gave good results, but was of very little use by itself.

Orisol.—This was used in twenty cases. On the whole the results were disappointing. Four cases were cured by this treatment alone in addition to local treatment. The minimum amount required was 5 c.cm. to cure two sores.

The dosage used was 1 c.cm. to 3 c.cm. per sore according to the size. It was a satisfactory form of treatment for single or small sores, but difficult and expensive in cases of multiple sores. Injections were made into the margins of the sores in four places so as to cover and infiltrate the whole area. A few cases showed a rapid improvement by drying up and forming a scab which, when it fell off, left a healed area. Other cases, the majority, showed no appreciable change. The patients complained of pain at the time of injection but this soon disappeared.

Neostibosan.—Owing to the cost of this drug only one case was treated with it. He was given nine intravenous injections of gr. 0.3 neostibosan on consecutive days. In addition his sores, nine in number, were dressed with normal saline changed twice daily. He improved so much at the end of his course that he was allowed to leave hospital and attend for dressings. In the table are given details of the cases treated.

Conclusions

1. Antimony in either its trivalent or pentavalent form is still the most effective and cheapest drug in the treatment of oriental sores.

The dose of potassium antimony tartrate should be regulated according to the weight of the patient and in any case should never exceed gr. 2 at one time. It must be carefully injected owing to the sloughing it causes if allowed to escape into the tissues. This is a severe drawback when one has to deal with large numbers of patients. One badly-injected dose causes so much pain to a patient that soon all hear of it and are apt to be nervous lest they too suffer in the same way.

In Roorkee with sometimes fifty men being treated at once there were three sloughs in the arm, during the whole period of treatment. If an accident has occurred and the arm is painful, then iodex is a useful application and gives some relief.

Neostibosan is expensive but is not so liable to cause sore arms or sloughing.

2. In chronic cases emetine hydrochloride gr. ½ to gr. 1 injected into the margins of the sores hastens the healing process produced by the antimony. This treatment is however rather painful.

3. Orisol (berberine), generally speaking, was not as successful as one might expect from the results claimed for it. For single sores or small lesions, before they have broken down, this drug gives good results. This latter conclusion was also arrived at by Napier (Knowles, 1934) some

EXPLANATION OF PLATE II

Fig. 7.—Case 8. Photograph taken three weeks after date of commencement of treatment. Was discharged as cured after two months' treatment with potassium antimony tartrate and local dressings of saline, iodine, and boric acid.

Figs. 8 and 9 show close-up views of left and right hand and wrist of same case three weeks later.

Fig. 10.—Same case showing condition on discharge. Note the severe scarring which remains and a certain degree of pitting.

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TABLE

Case number	Age	Minimum incubation period	Number of sores	*Leishmania tropica* found	Age of sore at commencement of treatment, months	Duration of treatment, days	Number of injections and total dosage						Local treatment	Results of treatment
							Antimony		Emetine		Berberine sulphate			
							no.	gr.	no.	gr.	no.	c.cm.		
1	24	14 days	5	+	3	63	11	15¼	2	1	1	2	Saline	Cured.
2	22	..	10	—	6	35	10	9½	..	..	..	..	,,	Ceased to attend.
3	21	2 months	2	—	1½	23	5	4½	..	..	..	..	,,	Cured.
4	25	3 ,,	2	—	1	56	10	8¾	2	1	..	..	,,	,,
5	46	2 ,,	17	—	1	65	8	6¾	2	1	..	..	,,	,,
6	24	In Quetta *	2	—	3	31	6	4¾	..	..	..	..	,,	,,
7	20	1 month	8	—	1½	90	16	14¾	3	1½	..	..	,,	,,
8	30	In Quetta *	15	+	4	63	6	6¼	..	..	..	..	Saline, iodine, boric acid.	,,
9	21	,,	6	—	4	60	8	9¼	..	..	..	..	Saline	,,
10	27	1 month	5	+	2	101	14	17¾	..	..	2	6	Spirit, saline sealed.	,,
11	22	1½ months	4	—	2	66	9	11¾	3	1½	..	..	Saline	,,
12	24	In Quetta *	5	—	4	64	6	6¼	3	1½	2	6	,,	,,
13	23	14 days	8	+	3	65	11	15	3	1½	..	..	,,	,,
14	..	3 months	2	—	10/30	35	3	2½	..	..	..	..	,,	,,
15	..	4 ,,	2	—	7/30	50	2	1½	..	..	2	4	,,	,,
16	..	4 ,,	3	+	..	57	3	2½	..	..	..	..	,,	,,
17	..	4 ,,	2	+	10/30	30	4	3½	..	..	..	..	,,	Relapsed.
18	..	3 ,,	1	+	1	30	5	4½	..	..	..	..	,,	On leave.
19	..	3 ,,	2	+	2	58	5	4½	..	..	1	3	,,	Cured.
20	..	3½ ,,	1	—	10/30	10	2	1½	..	..	..	..	,,	,,
21	..	3½ ,,	2	+	10/30	51	5	4½	2	1	4	9	,,	,,
22	..	3½ ,,	2	—	9/30	70	6	5½	..	..	3	8	,,	,,
23	..	3½ ,,	4	+	7/30	57	8	10½	..	..	..	..	,,	Relapsed.
24	..	3¾ ,,	1	+	7/30	16	3	2½	..	..	..	..	,,	On leave.
25	..	3¾ ,,	1	—	5/30	19	2	1½	..	..	..	..	,,	Cured.
26	..	2½ ,,	5	+	1	43	5	4½	..	..	2	5	,,	,,
27	..	3 ,,	2	+	1	104	5	4½	..	..	4	4	,,	,,
28	..	In Quetta *	4	+	7	64	2	1½	1	1½	3	6	,,	,,
29	..	2½ months	3	+	1½	50	4	3½	..	..	3	6	,,	,,
30	..	3 ,,	3	+	25/30	104	3	2½	..	..	4	8	,,	,,
31	..	3½ ,,	2	+	1	21	..	..	..	..	4	10	,,	,,
32	..	1 month	2	—	3	30	4	3½	..	..	..	..	,,	,,
33	..	1 ,,	1	+	3	30	4	3½	..	..	..	..	,,	On leave.
34	..	1 ,,	9	+	3	44	6	5½	..	..	..	..	,,	Cured.
35	..	3 months	4	+	1	58	12	18½	2	1	3	6	,,	,,

*Sores developed in Quetta, therefore incubation period is unknown.

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TABLE—*concld.*

Case number	Age	Minimum incubation period	Number of sores	*Leishmania tropica* found	Age of sore at commencement of treatment, months	Duration of treatment, days	Number of injections and total dosage						Local treatment	Results of treatment
							Antimony		Emetine		Berberine sulphate			
							no.	gr.	no.	gr.	no.	c.cm.		
36	..	4 months	3	—	7/30	58	4	3½	..	..	2	6	Saline	Cured.
37	..	3 „	1	+	1	53	3	2½	..	..	3	5	„	„
38	..	2 „	2	+	2	104	8	9½	..	..	7	10	„	„
39	..	1 month	10	+	3	34	2	1½	1	1	..	..	„	Relapsed.
40	..	3 months	3	+	1	70	5	4½	1	½	3	6	„	Cured.
41	..	3 „	1	+	20/30	24	4	3½	..	..	..	..	„	„
42	32	4 „	9	—	5	72	11	15½	3	1½	2	4½	„	„
43	22	14 days	1	+	4	62	5	4½	..	..	3	7	„	„
44	30	1 month	2	+	3	55	..	..	5	3½	..	..	„	Ceased to attend.
45	38	3 months	2	—	1	52	5	7	5	2½	2	4	„	Cured.
46	..	4 „	1	—	6/30	10	2	1½	..	..	..	..	„	„
47	30	In Quetta *	5	+	5	35	2	1½	2	3½	..	..	„	„
48	30	2 months	10	—	2	55	11	18	2	1½	..	..	Mag. sulph foments, saline sealed.	On leave.
49	24	4½ „	3	+	2½	32	..	..	2	1	2	3	Saline	Cured.
50	..	4½ „	2	+	3	28	..	..	..	..	2	5	„	„
51	22	In Quetta *	2	—	3	114	13	15½	4	2½	..	..	„	„
52	32	..	4	—	4	105	13	15½	..	..	..	..	„	„
53	27	3½ months	1	+	15/30	73	..	..	..	..	8	12	„	„
54	24	3½ „	2	—	4/30	50	6	5½	3	1½	..	..	„	„
55	30	3 „	2	+	2	97	10	9½	..	..	8	16	Copper sulph., saline sealed.	„
56	..	3½ „	1	—	1	70	..	..	..	..	6	6	Saline	„
57	..	3 „	3	+	1	106	10	9½	3	1½	1	2	„	„
58	..	5 „	2	+	10/30	40	3	2½	..	..	1	3	„	„
59	25	In Quetta *	9	+	9	97	11	10½	..	..	..	..	„	„
60	..	11 months	9	+	15/30	10	Neostibosan 2.7 gm.		..	..	..	..	„	Still under treatment.
61	24	6 „	2	—	5	85	9	8½	..	..	..	..	„	Cured.
62	22	5 „	2	+	2	85	10	9½	..	..	..	..	„	Still under treatment.
63	24	1 month	13	—	6	24	5	4½	..	..	..	..	„	Still under treatment.

*Sores developed in Quetta, therefore incubation period is unknown.

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years ago. Results with large or multiple sores are almost always disappointing.

4. Local dressings play a very important part in the rapidity of cure. There were many examples of patients who kept their dressings and sores clean which consequently healed up in from three to six weeks. There were many examples of others who were careless or ignorant and allowed their sores to become secondarily infected. They then took even as long as four months to cure.

Normal saline is a very satisfactory dressing, followed by iodine once healing has started.

5. Early treatment is most essential. The old-standing case is hard to cure: the recently developed case is comparatively easy to cure.

6. The total dosage of antimony required to effect a cure was less than is usually stated, due to the supplementary emetine or orisol and rigid local treatment.

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Varma, R. L. (1927). *Indian Med. Gaz.*, Vol. LXII, p. 84.

[*Note.*—There are surprisingly few clinical records—of a series of any significant size—of cases of oriental sore; we therefore welcome this contribution. There are a few points that seem to us to be of special interest.

Incubation period.—Circumstances made it possible to demarcate the minimum incubation

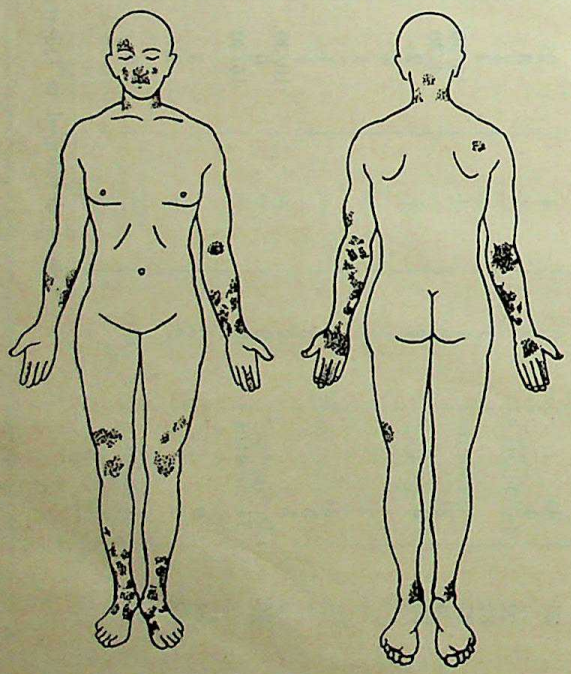


Fig. 11.—Leishmania +.

period. In 35 (or 56 per cent) it was three months or more, and in 12 (or 19 per cent) it was four months or more. Though it is known that the incubation period is quite frequently much longer than four months (Napier and Halder, 1936), yet the general impression on this subject is that it is *usually* shorter than

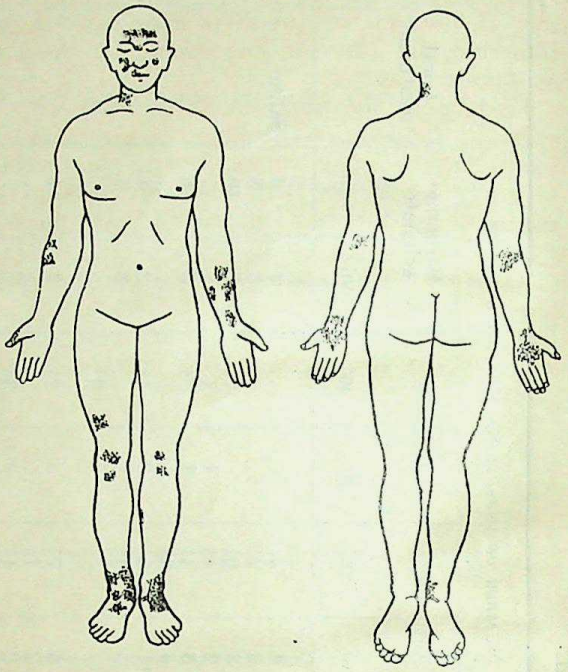


Fig. 12.—Leishmania —.

three months; this series indicates that this is not the case.

Distribution.—The spot maps shown here were kindly prepared by Captain Goodall at our suggestion. They bring out three points.

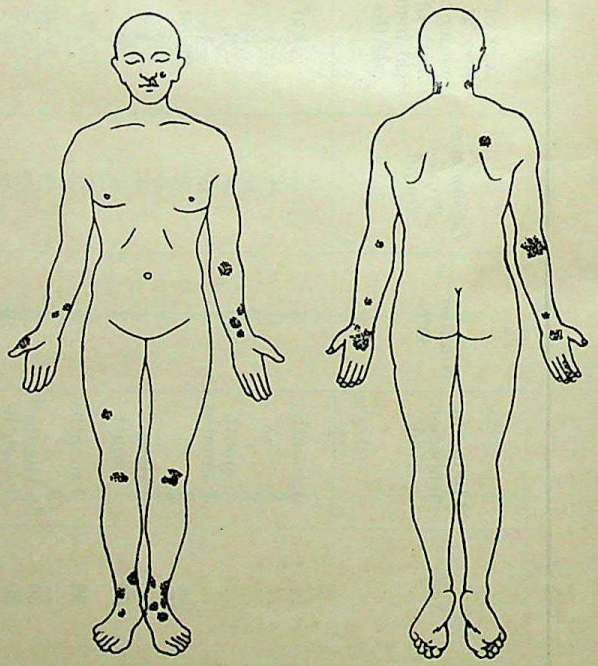


Fig. 13.—One or two sores only.

They confirm the observation, first emphasized by Acton (1919), that the sores occur on parts of the body most exposed to sandfly bites.

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The distribution is much the same in those cases in which there are one or two sores and in those in which there are multiple sores. This suggests that the ætiology of the initial sore is the same as that of the other sores; that is, it negatives, in these cases, any suggestion that the infection has spread by the blood or the lymphatics.

Finally, as the distribution is practically the same in those cases in which leishmania was found and those in which it was not found, it seems probable that the latter group were true cases of oriental sore in which the parasites were scanty.

Treatment.—On the whole, the results of treatment seem to have been satisfactory. In 51 cases a cure was effected in an average period of about one and three-quarter months; in three others the sores reappeared; and in nine

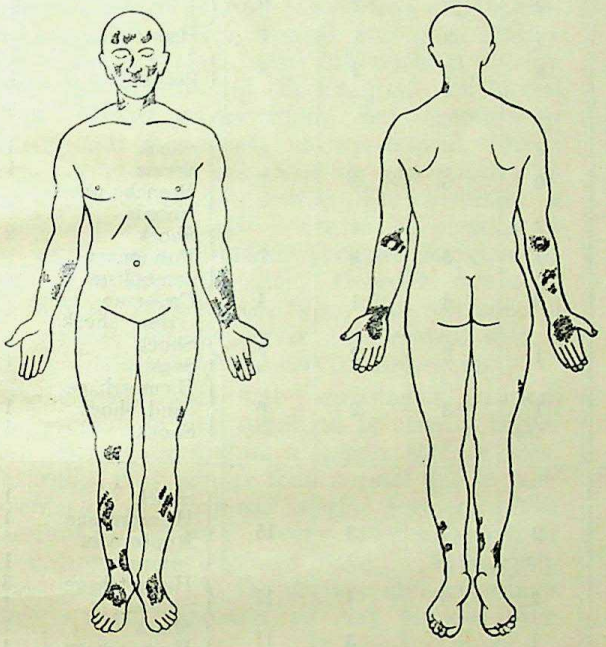


Fig. 14.—Multiple sores.

instances the results of treatment are not known.

From the point of view of appraising the value of the forms of treatment used, it is a pity that so much mixing of the different forms of treatment in the same individual had to be done, but research had to be sacrificed to utility, as the writer's primary objective was naturally to get the men back to duty as quickly as possible.

Of the 14 cases in which potassium antimony tartrate alone was given, the average duration of treatment was 48 days, but two of these relapsed. Of 16 cases in which more than one emetine injection was given in addition to the potassium antimony tartrate the average duration of the treatment was 60 days, but no relapses occurred; it is probable that in these cases

(*Continued at foot of next column*)

THE CLINICAL ASPECT OF PLACENTA PRÆVIA AND ITS MANAGEMENT IN INDIAN CONDITIONS*

By J. CHAKRAVERTI, M.B. (Cal.), M.C.O.G.

Associate Professor of Obstetrics and Gynæcology, Carmichael Medical College, Calcutta; Visiting Surgeon, Chittaranjan Seva Sadan, Calcutta; Honorary Visiting Gynæcologist, General Hospitals, Howrah, Calcutta

A PLACENTA is called 'prævia' when it is attached partly or wholly to the dilating zone of the uterus, *viz*, in the lower uterine segment. The condition produced goes by the name of 'unavoidable hæmorrhage' as the bleeding is inevitable. The condition has been known in the literature since the time of Hippocrates (de Lee, 1928) when it was thought to be prolapse of the normally-situated placenta. It forms one of the grave obstetrical complications as it constitutes the commonest important cause of antepartum hæmorrhage in the later months of pregnancy.

Incidence.—It is difficult to state correctly the incidence of this condition in India. The following table shows the number of cases in

* Being a paper read at the First All-India Congress of Obstetricians held in Madras in January last.

(*Continued from previous column*)

emetine was given because the response to the antimony treatment was slow. In the one case in which emetine alone was used the result was undetermined. In three cases in which berberine sulphate alone was used the results were all satisfactory, but the duration of treatment was above the average.

We feel that the series has demonstrated the value of potassium antimony tartrate as the mainstay in the treatment of the disease; this is important in view of the very low cost of this substance. (The sodium salt is equally efficacious and cheap, and we have found it less toxic.) It also demonstrates that a judicious combination of intravenous antimony with some form of local treatment is probably the most effective way of treating the disease. The writer seems to favour emetine but there is little evidence in his table to support this preference, and we have always found berberine sulphate very effective for single sores.

The writer seems satisfied with the progress in the case in which he used neostibosan. Our experience has led us to suspect that the trivalent antimony compounds are as effective as the pentavalent, but much more work needs to be done to establish this fact; we should like to see a large series in which sodium antimony tartrate, neostibosan, and fouadin were used on different cases.

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—L. E. N., EDITOR, *I. M. G.*]

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TABLE

Placenta prævia

	Year	Total labour cases	Total no. of P. P. cases	Gravida		Morbidity	Mortality		Cause of maternal death.
				Multipara	Primipara		Maternal	Fœtal	
Chittaranjan Seva Sadan, Calcutta	1930	800	11	10	1	7	0	10	
	1931	1,212	22	17	5	6	3	15	Hæmorrhage .. 2 Sepsis .. 1
	1932	1,355	23	20	3	20	2	15	Hæmorrhage .. 1 Sepsis .. 1
	1933	1,879	17	15	2	3	3	11	Hæmorrhage .. 2 Sepsis .. 1
	1934	2,084	29	28	1	12	1	16	Hæmorrhage .. 1
Carmichael Medical College, Calcutta	1930	412	6	5	1	2	0	3	
	1931	553	8	6	2	4	2	6	Sepsis .. 1 Hæmorrhage .. 1
	1932	756	14	12	2	5	2	9	Heart failure .. 1 ? .. 1
	1933	873	12	8	4	3	1	7	Hæmorrhage
	1934	1,302	9	6	3	6	2	4	? .. 1 Peritonitis .. 1
Eden Hospital, Medical College, Calcutta	1930	1,544	21	21	0	5	3	7	Shock .. 1 Sepsis .. 1 Broncho-pneumonia .. 1
	1931	1,712	29	28	1	5	3	7	Shock .. 2 Pulmonary embolism.
	1932	1,932	19	19	0	4	1	4	Cæsarean section, shock.
	1933	2,070	26	25	1	3	2	7	Shock .. 1 Sepsis .. 1
	1934	2,207	22	21	1	3	2	6	Hæmorrhage and shock .. 1 Shock .. 1
Government Hospital for Women and Children, Egmore, Madras	1930	3,059	21	19	2	7	3	15	Shock .. 1 Hæmorrhage .. 1 Rupture of uterus .. 1
	1931	3,119	24	22	2	4?	4	17	Hæmorrhage .. 3 Shock .. 1
	1932	3,174	16	15	1	?	3	11	Shock .. 2 Hæmorrhage .. 1
	1933	3,371	14	11	3	?	0	9	
	1934	3,355	35	31	4	8	5	29	Sepsis .. 1 Hæmorrhage and shock .. 4
The Nowrosjee Wadia Maternity Hospital, Bombay	1930	..	..	..	Not available		..	..	
	1931	4,106	31	26	5	8	2	26	Shock .. 1 Hæmorrhage .. 1
	1932	3,944	24	23	1	4	0	20	
	1933	4,302	24	22	2	5	3	20	Moribund .. 2 Shock .. 1
	1934	4,272	43	36	7	7	0	21	

Summary of table

Calcutta—Eden Hospital .. 1.2 per cent
Carmichael Hospital .. 1.2 „ „
Chittaranjan Seva Sadan .. 1.3 „ „

Calcutta Average .. 1.2 per cent
Madras .. .. 0.6 „ „
Bombay .. .. 0.8 „ „
Incidence in India .. 0.83 „ „
Incidence in the British Isles 1.1 „ „
Incidence in America varies widely—about 1 in 200

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5 years in the big hospitals of Calcutta, Madras and Bombay.

Thus, it will be seen from the above that the incidence of this condition in India is about 1 in 100. But it will certainly be higher if private cases are considered along with those in hospitals because, in India, unlike other countries in Europe and America, a fairly large number of cases, particularly those belonging to conservative families, are treated in private houses.

Morbid anatomy.—Under normal conditions the placenta is attached to the body of the uterus, most commonly to the posterior wall and less frequently to the anterior and lateral walls. In the last situation, however, it considerably encroaches on the anterior and posterior walls. The rarest place is the fundus (de Lee, 1928).

Although it is customary to classify the condition clinically into (*i*) central, (*ii*) marginal and (*iii*) lateral, a good deal of confusion still exists as there is some difference of opinion about the definition of the marginal and lateral types. Better terms would be complete or central and incomplete or non-central. Even then, these terms are more or less relative to the dilatation of the cervix. For instance, a placenta prævia which is central in position in the early stage of labour becomes marginal at the end of the first stage. Hence it would be appropriate to define the types with reference to the condition of the cervix, *e.g.*, central with 2 fingers dilatation of the cervix, and so on.

Besides the abnormal anatomical position, the placenta in this condition is usually bigger than normal, occupying a larger surface area. Naturally, it is thinner than normal due to poor vascularity of the lower uterine segment. The insertion of the cord is very often marginal or velamentous (Williams, 1931). Frequently infarcts are seen on the surface and sometimes there is fœtal anomally, as may be seen from case 1.

Symptomatology.—Placenta prævia has but one cardinal symptom, *viz*, visible hæmorrhage, which may be slight, moderate or severe and even, in some cases, fatal. The bleeding is spontaneous, *i.e.*, 'causeless'. It is painless and comes on suddenly without any warning, usually in the third trimester of pregnancy. Fortunately, bleeding in the first instance is usually slight in amount but it recurs at intervals of a few days or weeks. After the first appearance of bleeding, the subsequent attacks are precipitated by the slightest movements, *e.g.*, jolting or jerking, as in motoring or the act of coitus. The hæmorrhage is usually severe in the case of central and least in the case of lateral variety. Rarely, a case of lateral placenta prævia may bleed severely whereas a central one bleeds only when there is considerable advance in labour. Probably it depends more on the elasticity and contractility of the tissue to which the placenta is attached than merely on its anatomical position.

The condition is much more common in multipara than in primipara. The occurrence in relation to parity, multipara to primipara, is as follows :—

Calcutta	..	5 : 1
Madras	..	8 : 1
Bombay	..	8 : 1
Average for India	..	6 : 1
British Isles	..	5 : 1
America	..	10 : 1

The sources of the bleeding are mainly the utero-placental sinuses and, in rare instances, the villi which are traumatized by the examining fingers (Eden and Holland, 1931). The question may be asked, why does a placenta prævia bleed ? The reason is obvious when the patient is in labour as the cervix is drawn up like a sleeve over the placenta which lies in front. But a satisfactory explanation cannot be given when bleeding starts say at 28 weeks or before labour. Probably at this stage of pregnancy, the lower uterine segment which begins to form stretches gradually and the mature and fully-formed placenta attached to this part cannot keep pace with it. Naturally it becomes separated from the uterine wall, leaving open some of the utero-placental sinuses. This leads to the question of the origin of the lower uterine segment, which is one of the unsolved and controversial points in obstetrics. Personally, I think it grows from the isthmus which has a separate origin, distinct anatomical and histological features and separate nerve and blood supplies. This has been definitely proved by Prof. Oskar Fraenkle of Vienna in the 9th Congress of the Obstetricians and Gynæcologists of the British Empire at Birmingham in 1933. The other factor that keeps on the bleeding is the poverty of the musculature of the lower uterine segment in contrast with the body or upper uterine part. Normally the sinuses are closed only by the contraction of the muscular tissues which are deficient in the lower uterine segment.

Diagnosis.—The existence of placenta prævia is usually elicited by physical examinations—(*a*) abdominal, (*b*) vaginal; a definite diagnosis can only be made by *vaginal examination.* Before making a vaginal examination in a suspected case of placenta prævia the practitioner must be warned about two points which are of great practical importance : (*i*) *Rigid aseptic* precautions, as if one was going to perform a major operation. This applies both to the maternal parts as well as to the examining hands. (*ii*) Some suitable packing material such as sterile gauze or cotton should be kept ready by the side of the examiner. This may

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be necessary to control the bleeding, which usually takes places immediately after the examination, particularly in a private house and in a patient who has already been exsanguinated.

Recently, radiographic diagnosis of placenta prævia has been successfully performed by Francis Burke (1934 and 1935). Amniography was done after injecting the amniotic sac through the abdominal wall, with some radio-opaque substances, *e.g.*, uroselectan, or strontium iodide. The filling defect of the gestation sac shows the position of the placenta in the uterus. This is a distinct advance in the scientific methods of diagnosing a suspected case of placenta prævia before bleeding starts.

The diagnosis is to be made from other conditions which give rise to antepartum hæmorrhage, of which the most important is accidental hæmorrhage or ablatio placentæ. This condition is always associated with pain in the abdomen and a certain amount of shock. The blood is more or less mixed with dark clots. The uterus is tender and board-like to the touch. The condition is often accompanied by the presence of albumin in the urine. The fœtal heart sound disappears early.

It would be a wise principle to observe that, even in the absence of a positive finding, a painless and 'causeless' bleeding in a woman at the third trimester of pregnancy should be considered as due to placenta prævia and treated as such until there appears some positive evidence to prove it otherwise.

Prognosis.—It is one of the most difficult problems in obstetrics to prognose a case of placenta prævia. A case of lateral placenta prævia, which in the beginning appears easy and simple, ultimately becomes very severe and in some cases turns out to be fatal.

The prognosis depends on the following factors :—

(*i*) The condition in which a particular case first comes under treatment—if the patient has been received in an exsanguinated condition the prognosis is certainly not so favourable. Prognosis differs widely in 'booked' and emergency cases (Monro Kerr, 1933); 'booked' cases—3.1 per cent, and emergency—10.1 per cent death rate.

(*ii*) Environment—the outlook is certainly good if the patient is placed in the early stage in a well-organized maternity hospital equipped for abnormal cases.

(*iii*) The success depends more upon the skill of the attendant than upon any other single factor. To repeat the words of Rudolph Holmn (Davis, 1935)—'procrastination spells disaster in cases of placenta prævia'. At the same time it is equally true that injudicious and untimely interferences contribute a large share in causing high mortality, whereas the simplicity of operative procedures and its perfection materially alter prognosis.

(*iv*) Degree of prævia—it is always worse in central but fairly good in lateral.

(*v*) Postpartum hæmorrhage—this, even in small amount, which is of little significance in normal labour, is of material importance in a case of placenta prævia which has already been exsanguinated.

(*vi*) Infection—next to shock and hæmorrhage it is responsible for the high maternal mortality. In a five years' return (1926 to 1930) of the Glasgow Maternity Hospital—30 per cent deaths were due to sepsis. Referring to the table one finds that in the first two hospitals 6 out of 16 deaths were due to sepsis, *i.e.*, 37 per cent. This high maternal mortality in Bengal resulting from sepsis is due to the fact that nearly every patient was an emergency case and the tissue resistance and the vitality were very low on account of the prevalence of anæmia, malaria, kala-azar, etc. Hence the importance of maintaining rigid asepsis in making vaginal examinations in a suspected case of placenta prævia and also in any operative procedure. Infection is more common in cases following plugging adopted as a method of treatment.

Management.—As the condition is not preventable its treatment does not come under preventive midwifery although cases diagnosed in the antenatal clinics and kept under observation show better prognoses.

There are few more debated subjects in obstetrics than the treatment of placenta prævia. Before dealing with it, it is essential that the patient should be placed in the best environment. In this respect a well-equipped maternity hospital is the best, particularly in a case of central variety. In fact, the improvement in the mortality rate of this condition will depend largely on early hospitalization of the patient. Next preference goes to nursing homes. Unfortunately, these homes have not received much sympathy and popularity in this country, particularly in Bengal, excepting for special occasions. Europeans mostly patronize these homes; amongst the native population, few can do so because of lack of funds, social prejudices, etc. Conditions in these homes are much better in Bombay and Madras.

Lastly, comes the treatment in a private house. Of course, there is much to deprecate the domiciliary treatment of placenta prævia. In fact, in the British Isles, it is not generally adopted. But one has to modify the line of treatment according to the social customs and other prejudices prevalent in the country. In treating a case of placenta prævia in a private house, the practitioner with his assistants should be in constant attendance. He should not take any other emergency case in hand. All the armamentaria for use in a case of placenta prævia should be kept ready and the obstetrician should be within easy reach. Neglect to observe this rule sometimes causes disaster in a private house. But in any event, domiciliary

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treatment is strongly contra-indicated in poor houses, in insanitary surroundings and also in cases of central placenta prævia.

The management can be dealt with according to the various methods at our disposal, but a better plan would be to consider the treatment according to the different clinical pictures the patients usually present.

For the convenience of treatment and according to the commonest conditions in which patients are found, the cases may generally be classified as follows :—

Group A.—When the patient is not in labour and the cervix is closed or just admits the tip of a finger in a multipara.

Group B.—When the patient is in labour or the cervix is dilated 2 fingers.

Group C.—Central—the placenta covers the whole of the internal os.

Group A

1. *In slight cases* (bleeding not exceeding 2 to 4 ounces)—*expectant treatment*—watchful expectancy with rest in bed and sedatives. Authorities differ in this line of treatment, once the diagnosis is established. In my opinion, a patient may be treated on these lines provided she is placed in a suitable environment, hospital or private house, where every possible arrangement has been made for emergency help. The signals of danger should be given to the nurse in writing and the armamentaria for the need of a case of placenta prævia should be kept ready. 'Expectant treatment is indicated in a case of an elderly primipara whose chance of becoming pregnant again is remote. It is contra-indicated in full-term pregnancy or when a patient is in labour and when the placenta covers the internal os, *i.e.*, is central'.

2. In moderate or severe cases—plugging. This is the old Rotunda method prescribed for over a century (Eden and Holland, 1931).

Patients are often seen in the hospital that have been sent by private practitioners, as well as by other maternity homes under the City Corporation, after plugging which was performed in an improper and ineffective way. In order to be effective, this small but temporary life-saving operation in a case of placenta prævia must be done thoroughly and methodically. Plugging in a case of placenta prævia to be effective cannot be done without instruments of which only a few are necessary. It also requires good light, particularly in a private house, and an assistant to hold the legs. Plugging should be preceded by rupture of the membranes whenever possible and followed by application of a tight abdominal binder.

The patient should be catheterized every 8 to 12 hours. If no pain starts the plugs should be changed after 12 to 16 hours in the summer, 24 to 32 hours in the winter.

Group B

This is the commonest condition in which most of the placenta prævia cases are seen in India.

1. *If lateral (high placenta prævia).*—Rupture the membranes and apply a tight abdominal binder. This is the ideal method of managing a case of placenta prævia with safety to the mother as well to the baby. In fact, this method contributes largely to lowering the mortality rate, but its application is limited only to this variety of case. Sometimes, rupture of the membranes has to be supplemented by forceps or craniotomy. Rupture of the membranes should never be done if the presentation is transverse.

2. *If marginal.*—Bleeding should be controlled by any one of the following methods and the remainder of the delivery left to nature, *i.e.*, to be terminated slowly and spontaneously.

(*a*) *Pressure of half breech over the bleeding placental area.*—(*i*) In breech presentation —it is easy; a leg is to be brought down after rupturing the membranes. (*ii*) In head or transverse presentation (*a*) version, if possible external; otherwise bipolar followed by bringing down a leg. In the majority of cases, the head presents and external version is not possible and the cervix does not allow internal version—hence bipolar podalic version is the method of choice.

Bipolar podalic version (Braxton Hick's) is the old but efficient method of managing a case of placenta prævia. It can be performed anywhere and at any time and practically in all varieties of cases of placenta prævia, if the cervix admits only 2 fingers which in a case of multipara is not uncommon. The method requires only one assistant and practically no instruments, but some training on the part of the obstetrician is of immense value. After version a foot is brought down to the vulva, heel pointing upwards and traction is put on just sufficient to stop bleeding. No time should be lost to find out the upper or lower leg. Difficulties may be experienced, (*i*) in rupturing the membranes which are not always easy to reach in a case of placenta prævia, (*ii*) in turning the child if the legs are extended, (*iii*) in finding the leg (a mistake may be made with a hand), and (*iv*) the leg may slip from the hand near the internal os. These difficulties are to a certain extent caused by want of experience. During the efforts to overcome these difficulties, a patient in the hands of a young specialist may bleed profusely. In such an eventuality, it is advisable that the obstetrician should change his line of action. Plugging should be resorted to to stop bleeding and the patient treated for loss of blood; otherwise his firm determination is sure to cause disaster. This is the first part of the treatment which should be performed quickly but methodically. The remainder of the management should be left to nature and

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all the rules of a breech presentation should be strictly followed. Traction is to be applied only when bleeding starts and the amount should be just sufficient to stop bleeding. The motto should be *quick version and slow extraction.* During the valuable interval in between, the patient should be treated for loss of blood. Negligence to observe this rule often causes disaster; I have seen patients, both in hospitals and in private houses, brought actually to a critical condition due to non-observance of this rule by young obstetricians, who in their attempt to secure 'double honours' institute early traction. It should always be remembered that *safety of the mother is always the first thing, and should not be sacrificed for the sake of the child.* It should never be forgotten that *anæmic patients stand shock very badly* and it is nowhere more true than in India because under normal condition the blood of the average Indian woman is much poorer than that of her European sister. This can be easily seen from the following figures :—

	Hæmoglobin (gram)	Erythrocytes (millions)	Colour index
Healthy Bengali women between 16 to 35 years (1934) (Dhar, 1934-1935).	11.47	3.73	0.995
Healthy English women, the same age (Ben Jones).	13.9	5.01	1.00

Further, injudicious and energetic traction easily cause extensive laceration of the cervix in a case of placenta prævia, resulting in post-partum hæmorrhage.

In my personal experience both in hospital and private practice, the proper management of placenta prævia by this method terminates labour spontaneously in two to six hours after bipolar podalic version and in the majority of the cases with living children, unless the patient had already bled sufficiently to cause intra-uterine death, or a badly asphyxiated condition, of the child. Sometimes, the after-coming head requires some assistance.

(*b*) *If the head presents and the child is living :—Scalp traction is equally effective.*— This method was introduced by the late Dr. Willett (Bourne and Williams, 1932) in 1923. His preliminary report was based upon only a few cases in the City of London Lying-in Hospital. At first he used an ordinary strong volsellum and subsequently improved the instrument, which goes by his name (Willett forceps). Conditions to be fulfilled for its application are :—

(*i*) the cervix must admit two fingers, loose,
(*ii*) the patient should be in labour and
(*iii*) the child must be living and there must be a head presentation.

The membranes are ruptured and the forceps applied, taking a good grip of the scalp.

My personal experience of this method is very limited. It is not always easy to apply the forceps on the head, which is usually floating in placenta prævia, and to take a good bite of the scalp. Besides, unless it is applied near about the occipital region, there will be extension of the head, which causes difficulty in engagement under normal condition, far more so in a case where the lower uterine segment is occupied by the placenta. Sometimes, the scalp is cut through; this gives rise to sepsis which a new-born baby stands badly. Traction sufficient to stop bleeding only is required, *i.e.*, average 1 to 2 lbs. to the handle of the forceps connected with a pulley at the foot end of the bed.

(*c*) *The pressure of a hydrostatic bag.*—15 years ago this was the standard and favourite method of treating a case of placenta prævia. The bag has now become an obsolete instrument in hospitals in Calcutta, and it has fallen into disrepute in the hands of British obstetricians; there are many reasons for condemning its use. But in America the application of the hydrostatic bag still enjoys a high reputation in nearly every clinic.

(*d*) *Plugging :—Cervico-vaginal.*—Once a favourite method of treatment in this variety of placenta prævia, it is not very popular now. The gradual decline in popularity is probably due to—

(*i*) Unreliability of controlling hæmorrhage. Following this method the bleeding which sometimes continues may become either external or internal.

(*ii*) Sepsis following plugging is high, giving rise to an increase in morbidity.

(*iii*) Displaces the presenting parts.

(*iv*) Often requires other methods to supplement it.

(*v*) Possibility of rupture of the uterus if plugs are not timely removed—at least plugging was the only interference in H. D. De Sa's case of spontaneous rupture of the uterus in placenta prævia mentioned below.

Still, cervico-vaginal plug has a place as a method of treatment in cases of placenta prævia,

(1) as ambulatory treatment,
(2) when bipolar version fails, and
(3) in central placenta prævia when the patient's condition is too low for Cæsarean section.

(*e*) *Cæsarean section.*—The increasing popularity of the Cæsarean section has led to its widespread application in the hands of young obstetricians and it has replaced the art of midwifery in several conditions. This encouragement is simply due to its low mortality. Perhaps this is a transitional phase and a sufficiently long experience will turn the balance in the opposite direction. To a serious and thoughtful obstetrician the application of Cæsarean

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section in marginal placenta prævia is limited to, *(i)* rigidity of the cervix and other obstruction to vaginal manipulation, *(ii)* elderly primiparæ—if the patient be very anxious for a child, and even in such a case the condition of the child and the possibility of prematurity should be duly considered.

Group C

It has already been mentioned that hospital is the best and safest place for such cases. Cæsarean section is to be performed if the patient's condition is good. If the patient has already lost a considerable quantity of blood, plugging should be resorted to followed by treatment for the loss of blood by saline or blood transfusion. When the patient's condition improves, labour should be terminated by classical Cæsarean section, irrespective of the child's condition. If the patient is in unfavourable surroundings, where Cæsarean section is not possible or safe or the medical attendant is not skilled to abdominal surgery, rupture of the membranes by going through the placenta and bringing down a leg should be adopted. Considerable hæmorrhage may take place, but there is no other alternative in such circumstances. In fact, this is the only method of treating a case of central placenta prævia in rural areas where there is no facility for opening the abdomen.

Further, *if the patient is brought in a collapsed condition,* which is not a rare event in obstetric practice in our country, the patient should be carefully removed from the ambulance and treated for shock and loss of blood. These patients have little blood to lose, hence no interference should be attempted till they come round. Usually these cases are fatal within a few hours.

Next comes the *management of the third stage.* The importance of smooth performance of this stage of labour in a case of placenta prævia cannot be over-estimated. A large percentage of cases of placenta prævia suffer from postpartum hæmorrhage and some of them in such profuse amounts that the patients die before anything can be done for them. Postpartum hæmorrhage even of moderate degree, which is of no significance in an otherwise normal case, becomes a lethal factor in a case of placenta prævia which has already been exsanguinated. If the placenta is not cast, it should be squeezed out or manually removed without delay. If the placenta is cast, intra-uterine plugging should be done followed by treatment for loss of blood. Tentative methods to arrest bleeding should not be adopted.

Saline transfusion

The urgent necessity for saline transfusion in a case of placenta prævia cannot be over-estimated. In fact, it is the team work of immediate saline transfusion and skilful, prompt and judicious surgical or obstetrical interference, combined with safe anæsthesia, which brings success in a desperate case of placenta prævia in a well-equipped maternity hospital. In private houses, the saline-transfusion apparatus should be kept ready as a routine practice in any case of placenta prævia. A case, which in the beginning appears mild and simple, often turns out to be severe and complicated as the labour advances and interference commences.

Blood transfusion

The most efficient and scientific way of treating a case of acute hæmorrhage is by supplying the system with the same vital fluid. If carefully performed, it is practically devoid of risk. In fact in nearly every clinic in the British Isles a case of placenta prævia is 'grouped' immediately on admission and the suitably-matched registered donor is informed and kept within easy reach. In Bengal, transfusion has not acquired such popularity yet, possibly due to want of suitable organization and partly due to social prejudice and ignorance of the people.

The responsibility of the accoucheur does not end with the termination of labour. A patient in a private house should be watched for bleeding for at least four hours before she is handed over to a nurse and things for plugging should be kept ready during this period.

Morbidity

A considerable number of cases run a morbid temperature and some of them are definitely septic. In a five-year return of the hospitals in Calcutta we find the following figures :—

	Per cent
Eden Hospital	18
Carmichael Medical College Hospitals	45
Chittaranjan Seva Sadan ..	49
Average morbidity, Calcutta ..	37
Madras	15
Bombay	19.7
Average morbidity in India ..	24

Hence precautionary measures should be taken to cope with it. In a suspected case, serum in adequate doses should be administered early. The patient's strength should be maintained by easily assimilable diet with plenty of glucose, stimulants and vitamins.

Mortality.—According to the table under review, the average mortality rate of placenta prævia treated in Indian conditions is 9 per cent.

	Per cent
Eden Hospital	9.7
Carmichael Medical College Hospitals	14.25
Chittaranjan Seva Sadan ..	9

Average mean figures :—

	Per cent
Calcutta	11
Madras	13
Bombay	4

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Credit is due to the staff of the Nowrosjee Wadia Maternity Hospital, Bombay, one of the biggest institutions in India, where the average mortality is only 4 per cent. In the years 1932 and 1934, the number of cases of placenta prævia treated in this hospital were 24 and 43, respectively, without any mortality. These are not only the lowest figures in India but certainly far below those in many hospitals in the British Isles.

	Per cent
Queen Charlotte's	9
St. Mary's (Manchester 1933) ..	6
Royal Maternity (Glasgow 1932) ..	11

This low mortality in the Bombay Hospital may be due either to many cases being diagnosed in the antenatal clinics or perhaps the women in Bombay are more frightened of bleeding than their sisters in other provinces and go to hospital early; naturally, the hospital receives them in a better condition. But one interesting fact which cannot be overlooked is that the methods of treatment in this hospital were rupture of the membranes and version, with occasional application of Willet's forceps. Perhaps these methods of treatment formed an important factor in producing such brilliant results.

Summary

Placenta prævia which constitutes one of the important and common causes of antepartum hæmorrhage has been considered from its various clinical aspects.

The statistics of the important hospitals of Calcutta, Madras and Bombay have been considered with special reference to the incidence, parity, morbidity and mortality. The management of the condition has been fully dealt with from the point of view of the commonest conditions in which patients are generally seen in Bengal. Practical difficulties as encountered in India in the course of treatment have been explained and the methods of coping with them have been described.

Interesting cases have been fully described.

Case 1.—Age 18, admitted to the Carmichael Medical College Hospitals on the 17th September, 1935, at 0-15 p.m., with a history of seven months' amenorrhœa complaining of sudden distension of the abdomen for four days, and slight pain in the lower abdomen for 24 hours.

She was a primigravida. The height of the uterus was to the level of the xiphoid cartilage; it was globular in outline, prominent in front, very tense but not tender, thrill present. The skin over it was tense and shining. The fœtal parts were not felt, nor was the fœtal heart sound heard. Pulse/resp. rate = 114/22, volume and tension good.

Per vaginam.—Os two fingers dilated, cervix thick, head presenting, membranes present but not tense. The patient bled slightly during examination and on further exploration placental tissue was felt in the left post-lateral quadrant of the cervix. The membranes were ruptured with a Kocker's forceps but only 2 to 3 ounces liquor amnii came out. The head was low down in the cavity. The height and tension of the uterus remained the same. An attempt at scalp traction, cut through the scalp. As there was no active bleeding, the patient was kept on the table under watchful expectancy and given sedatives. A diagnosis of twins with hydramnios of the second sac, complicated by lateral placenta prævia, was made.

At 8-10 p.m., when the cervix was taken up and the os was 3 fingers, loose, a dead and partly mummified child was born spontaneously. The membranes of the second sac were ruptured artificially and six pints of clear fluid came out, followed immediately by the delivery of a dead but not mummified child with talipes of both feet. The placenta followed the birth of the child. It was uniovular with only two amniotic sacs. There was no post-partum hæmorrhage. The patient had an uneventful puerperium.

It was an interesting case of twin pregnancy with acute hydramnios of the second sac and talipes of the second fœtus complicated by lateral placenta prævia.

Case 2.—Age 28, admitted to Chittaranjan Seva Sadan at 8-40 a.m., on 27th July, 1935; she came in from Bugnan, about 20 miles from Calcutta, with history of (*i*) amenorrhœa for nine months, and (*ii*) painless profuse bleeding for the last five days, off and on, with sudden onset and no labour pains.

Temperature 100.4°F. Pulse/resp. rate = 124/30. Pulse soft and irregular; respiration, somewhat difficult. She was very anæmic, extremities cold, and not responding to questions properly. Heart sounds weak and quick; lungs—clear.

The uterus was the size of eight months' pregnancy, soft, not tender; no painful contraction present. No fœtal heart sounds. Head presenting and floating.

Per vaginam.—Vagina full of blood clot, cervix taken up considerably, admitted 2 fingers.

Placental tissue felt in the left post-quadrant. The patient started bleeding freely. The membranes were ruptured, about 10 ounces of liquor amnii drained out and the cervix and vagina tightly plugged with gauze and cotton-wool. The bleeding stopped. A sterile pad and a tight abdominal binder put on. The pulse of the patient became very soft, feeble, rapid and irregular.

Subcutaneous saline Oii given statim; oxygen inhalation; foot end of the table raised. The patient kept warm under blanket and hot water bottles to the sides.

At 10-30 *a.m.*—Normal saline Oii. } Intravenously.
Glucose 25 per cent 40 c.c. }
Cardiozol 1 c.c. Hypodermically.

8 *p.m.*—The pulse condition slightly improved but still soft and rapid not justifying any interference.

Pulse/resp. rate = 120/40. Temperature 100.6°F.

There were no labour pains and no blood discharge *per vaginam*. The patient complained of pain all over the body—some evidence of reaction.

Rectal saline 6 oz. every four hours continued.

3 *a.m.*—Pulse imperceptible in both wrists. Heart sounds fœtal in character 146; respiration 46, laboured. No blood discharge *per vaginam*—uterus contracting, now and again; adrenalin 1 c.cm. injected.

6 *a.m.*—The condition gradually grew worse and the patient expired.

After death, on removal of the vaginal plug a good amount of fluid blood came out through the cervix and the placenta was found separated considerably. These revealed that hæmorrhage continued and remained concealed after plugging; this was probably the cause of death.

Case 3.—Age 24, fourth pregnancy, admitted to Chittaranjan Seva Sadan at 5-45 p.m. on 7th November, 1934, with history of (*i*) amenorrhœa for ten months and (*ii*) sudden onset of bleeding since 4 p.m. not attended with any pain, temperature 99.6°F., pulse/resp. rate = 100/22.

Uterus size of ten months' pregnancy, soft, no pain, fœtal parts easily palpable. Head presenting, high up and floating.

Fœtal heart sounds in the right lower quadrant.

Per vaginam.—Bleeding present; cervix nearly taken up; os 2 fingers, loose through the cervix the placental tissue only felt all round; head presenting high up.

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The patient started bleeding profusely immediately after examination.

6-15 *p.m.*—Vagina was tightly plugged with iodoform gauze and cotton-wool—without rupturing the membranes.

The patient was prepared for Cæsarean section. She was restless but had no pain; pulse 120 soft and volume small.

Temperature 98°F. Blood pressure 90/75.

Normal saline O i ss } Intravenously.
Glucose 25 per cent 50 c.c. }

Continuous oxygen given.

9 *p.m.*—The patient's condition improved slightly; restlessness disappeared. Pulse soft and moderate tension; classical Cæsarean section was performed—baby living, male, 6 lb., though asphyxiated it revived—no post-partum hæmorrhage. The usual post-operative treatment was done.

The patient recovered from the shock without any trouble and the baby started breathing easily.

8th November, 1934, 4 *p.m.*—Suddenly the baby started to bring out profusely bright blood with froth through the nose and mouth, it grew pale, gasped, and died soon after, before any treatment could be given.

Post-mortem examination of the baby did not reveal any abnormality excepting a few hæmorrhagic spots on the anterior wall of the heart along the course of the coronary vessels and dark areas of consolidation here and there in both lungs.

The puerperium up to the 19th day was uneventful, only the temperature went up to 99.6°F. on two occasions.

On the 20th day the patient started bleeding; this persisted for three to four days. On the 24th day of observation the uterus was found bulky, mobile, cervix patulous admitting a finger easily and through which a soft polypoid mass attached by a pedicle was found hanging. It was removed and the uterus was swabbed out with iodine and the bleeding stopped—placental polypus. The patient went home—cured on the 28th day (6th December, 1934).

This was a case of central prævia with severe bleeding, treated by vaginal plugging, followed by Cæsarean section.

In conclusion, I acknowledge with thanks the information supplied by the Superintendent of the Eden Hospital. I also express my indebtedness to the Principal, Carmichael Medical College, and the senior visiting surgeon, Chittaranjan Seva Sadan, for permitting me to publish the returns and cases. My thanks are also due to the intern officers of the above hospitals for helping me in collecting the figures.

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PUERPERAL SEPSIS : A REVIEW

By P. C. DUTTA, M.B., F.R.C.S.(E.), D.G.O.
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A good deal of work has lately been done by various clinicians and laboratory workers on this subject. Some of the results are very useful while others are of doubtful utility. A summary of our present state of knowledge may help that most useful medical member of society, the general practitioner.

It has been very rightly said by Solomons (1931) that the best treatment of puerperal sepsis is prevention. The first essential to attain this is to maintain the physical condition of the mother, so that she may be able to resist infections. This can best be achieved by proper antenatal care, adequate nutrition and the prevention of anæmia. Secondly, the attendant must be thoroughly conversant with the mechanism of labour. This will restrict meddlesome midwifery to the minimum, no interference will be made before it is really indicated, there will be no unnecessary use of forceps, operations, and so on. The attendant must be able to gauge the powers of the uterus, when and how far it has to be helped and when it has to be soothed. This can only be acquired by thorough training and careful observation of cases throughout labour. Thirdly, the knowledge of the source of infection and methods of prevention. It must be realized that it is the neglect of simple things that cause 80 per cent of puerperal infection.

Without going into unnecessary details and discussions it can safely be stated that in nearly all cases of sepsis the infection is caused by introduction of organisms from outside. They may be introduced by the attendant or by the patient herself. Dora Colebrook (1935) and Griffith (1934) found that the 11 types of hæmolytic streptococci which cause the majority of puerperal cases are also found in infections of the throat and Colebrook and Maxted (1933), after a series of very thorough and painstaking investigations, conclude that in most cases the source of the infection is the throat. It may be the patient's throat, the attendant's throat or the throat of some other person with whom the mother came in contact. The organisms may be lurking about in a handkerchief, a mattress, a not-properly-sterilized wash-hand bowl and similar articles with which the mother comes in contact directly or indirectly during labour. As a matter of fact any infection in the house, *e.g.*, otitis media, erysipelas, nasal sinus infection, whitlow or even a trivial infection of a finger, impetigo, etc., are very real sources of danger. The possibility of puerperal sepsis arising by streptococci from the throat, through the blood stream, has practically been ruled out. The microbe is transferred by some external route.

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The practice of ablution with bare hands, after defæcation is, in my opinion, a constant source of danger in obstetric practice, unless the hands are thoroughly washed and disinfected. Certain investigations convinced me that fæcal organisms could be grown from the hands, after ordinary washings as is done in a day's work, after 24 hours.

Lately, our attention has been drawn to post abortal and puerperal infection by the gas gangrene bacillus and I have seen occasional cases of this. I do not think it is very uncommon in our country. These infections are nearly always caused by fæcal contamination. In Europe and other countries this may reasonably be due to extension of infection from the mother's anus, whereas in this country where the woman washes herself more or less thoroughly after defæcation, they may be introduced from the patient's or from the attendant's hands. Bearing these facts in mind, I would advise that the doctor should take every precaution to avoid contamination of his hands with fæcal matter. I leave the method to individual choice and discretion.

I. Prevention of introduction of organisms

Before the actual confinement is undertaken a thorough investigation must be made if there is infection, specially streptococcal, in the family or outside the family with whom the mother comes in contact, and strict measures must be adopted to avoid these. If any sort of streptococcal infection is present in the house, the mother should be confined in a hospital or nursing home, because the organisms may gain entrance by so many insidious ways that it is practically impossible to prevent in a private house.

In 20 per cent of septic cases, it was found that infection with the same type of organism was present in some member of the family and in another 20 per cent the mother came in contact with someone suffering from streptococcal infection of the same type. Bedding and linen may be infected from the air by droplet infection from some member of the family and it must be realized that the organisms may persist in these articles for some time. Similarly, basins, towels, handkerchiefs of the mother or of the attendants are constant sources of danger.

Hands of the attendant

Thorough washing with soap and water is the most important item in the antiseptic technique. They must be thoroughly washed with soap and water and scrubbed with a nail brush. Ordinary yellow household soap is better than refined toilet soaps and soft soaps. Antiseptic soaps, *e.g.*, those incorporating carbolic acid or coal tar products are slightly more bactericidal than ordinary yellow soap.

After washing the hands for two to three minutes and soaking them for three minutes in perchloride of mercury (1 in 1,000) or lysol (1 in 60), as is usually done, organisms can always be cultivated from the hands and fingers. Colebrook (1936) has shown that washing with ordinary soap and water and then rubbing the hands with dettol cream cleanses the hands more thoroughly of the organisms than any other practicable method known at present.

Cruickshank found that the hands may be reinfected from the air as early as two minutes after washing and disinfection by the ordinary antiseptics. Colebrook demonstrated that this reinfection can be prevented for two to five hours if 10 per cent dettol or 30 per cent dettol cream is rubbed on the hands. He strongly advises this procedure with bare or gloved hands and this should be repeated every two hours.

Dettol has an oily base which sticks on to the surface forming an invisible film, and organisms coming in contact with it are destroyed. The effect lasts from two to five hours.

Masks

These should be used in all cases if possible. In the hot weather it is better to use a two-piece mask. A strip of old towelling (old towel soaks better) about 2 inches wide and 8 inches or 10 inches long with tapes at either end is tied over the forehead and is very necessary to prevent perspiration dripping from the forehead on to the hands, instruments or perineum. The mask proper is made of a piece of linen 8 to 10 inches by 6 to 8 inches. The central part of this is cut off leaving a margin of about 2 inches on all sides. A six-fold piece of gauze is sewn in to fill up the gap. This will keep the face fairly comfortable even in the hot weather.

Gloves

They must be thoroughly sterilized. The outer side of the glove must not be contaminated when putting them on and every doctor and medical student should learn how to put on a pair of gloves without 'mauling' them. When the gloves are put on, the fingers should be adjusted with a sterile piece of gauze. Smearing them with 10 per cent dettol or 30 per cent dettol cream will prevent reinfection from the air.

Basins and utensils

They must be thoroughly disinfected either by boiling, burning spirit in them, or scouring them with some strong antiseptic, *e.g.*, a few drops of 10 per cent lysol, pure dettol, etc.

Water for confinement

If cold sterile water is not available, cyllin one drachm in three pints of water, will sterilize it for the purpose.

Patient's hands

In about 4 per cent of normal women, Colebrook (1936) was able to grow the same type of

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organisms from the mother's hands as are usually responsible for puerperal infection. It is almost unbelievable how often the woman in labour pain will put her hands in this so-closely-guarded spot. Therefore, the patient's hands should also be thoroughly scrubbed and washed and rubbed with dettol.

Preparation of vulva and perineum

Vulva and perineum are cleaned with soap and water and painted with an antiseptic, *e.g.*, methylene blue or crystal violet. Colebrook recommends 30 per cent dettol cream and has reported very good results by using this.

Vaginal examination

Unnecessary examinations must be avoided. In a normal case no interference should be made with the vagina and it should not be painted with any antiseptic.

When vaginal examination has to be made, the vulva should be thoroughly rubbed with some antiseptic such as crystal violet, methylene blue or 30 per cent dettol cream. In making a vaginal examination the vulva should be widely separated with the left hand so that no organisms are pushed into the vagina from outside. The vaginal examination must be done at least five minutes after painting the part with the antiseptic. When an examination is made, it must be done thoroughly and the attendant should not bring out the fingers until he is satisfied. Repeated withdrawal and introduction of the fingers will only help infection. The disinfectant should be re-applied every three hours and before any internal manipulation.

Douching the uterus after operative delivery

An extract from the final report of the departmental committee on maternal mortality and morbidity is here quoted : 'It is practically certain that antiseptics will fail to kill pathogenic bacteria at the termination of labour when the whole genital tract is bathed in blood and serum. Firstly, because the microbes at the time if not already in the tissues are to a large extent caught up in the meshes of the blood clot, and no antiseptic can diffuse into the blood clot in a concentration sufficient to kill microbes unless it is present for a long period in a very high concentration—a condition which cannot be maintained in the genital tract because of the constant outward stream from the placental site. Secondly, antiseptics will fail in these circumstances because all of them when brought into contact with undiluted blood and naked fixed tissue cells such as those of the placental site will combine in great mass and in so doing will forfeit their power to combine with and kill the relatively negligible mass of microbes. Not only will the antiseptics fail in these circumstances but they will probably often do harm. For it has been clearly shown that in contact with the blood most of the antiseptics destroy the leucocytes upon which the bactericidal efficiency of the blood chiefly depends. There can be little doubt that the mother's best chance of escaping infection lies in the imprisonment of the microbes in the blood clot and their destruction here by the agency of the leucocytes'.

II. Prophylactic treatment of sepsis

Maintaining the mother's health in perfect condition in the antenatal period, as has already been stated, is of supreme importance. This has to be done with adequate dietary. When the diet is deficient, proprietary preparations should be used to prevent anæmia and vitamin deficiency. In India where the average doctor has to work under conditions far from ideal, he must improve this, his first line of defence. For this purpose some concentrated preparation of vitamin A is most useful.

Green-Armytage and Dutta (1932) years ago recommended small doses of quinine in the last few months of pregnancy. This is now advocated by many other authorities. It is doubly useful in this country. It not only increases the resistance of the patient but will keep the old malarial infection, from which most people suffer, at bay, during the puerperium. It is a common experience in this country that old malaria often flares up at the puerperium. Moreover small doses of quinine will improve the tone of the uterine muscle and ensure efficient contraction during labour. This in its turn will lead to less interference, less incidence of forceps delivery and consequently less chance of sepsis. Primary uterine inertia due to flabbiness of the uterus is so common in this country that it is a real help. Even after a normal delivery it is very wise to put the woman on a mixture containing ergot and quinine for a few days to ensure a well-contracted uterus and to stop the old malaria.

Thompson (1935) recommends ½ gr. doses of *calcium sulphide* thrice daily as a routine from the day of admission or preferably from the prenatal period. It is given in a capsule with *halibut oil*. The treatment is cheap and efficient.

Antistreptococcal serum

Cameron and Thompson (1931) obtained very good results with this, but lately they have reported far better results with halibut oil and calcium sulphide.

Solomons (1935) during the tenure of his mastership of Rotunda Hospital used 20 c.cm. of antistreptococcal serum as a routine prophylactic in all difficult cases and reported greatly improved results. He uses it after all operative deliveries except low forceps.

Colebrook (1934) is of opinion that the prophylactic action of serum is doubtful, and, on the analogy of experimental animals, states that the serum may interfere with the ability of the patient to deal with infections in a

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previously sensitized patient, and as such may be positively harmful.

Iodine.—In a previous paper I (Dutta, 1929) remarked that iodine given as a prophylactic was found useful. I have used ordinary aqueous solution of iodine with potassium iodide intravenously for the purpose and confirm my previous observations. Moreover, this drug being very cheap and always available in every dispensary is within everybody's reach. For curative purposes, I do not think it to be of much use.

Prontosil.—This has been used for prophylactic purposes with good results.

As noted above quinine and ergot should be given in all cases for the first eight days. It does not matter what preparations are used so long as they are effective.

Many other antiseptics have been recommended from time to time but they have not stood the test of time.

III. Treatment of puerperal sepsis

The modern treatment of puerperal sepsis is to increase the resistance of the patient.

Mild cases get well with postural drainage, hot fomentations to the abdomen, ergot, quinine and possibly 20 c.cm. of antistreptococcal serum combined with fresh air and good sleep. Digital exploration should never be done unless a piece of placenta has been left behind.

Remington Hobb's treatment.—This consists of intra-uterine injection of sterile glycerine. It has been recommended that the injection should be done three times a day through a special catheter kept in the uterus. This may be possible in a special hospital where trained assistants are available. In the average district hospital or private practice it is not possible and I recommend injection of 20 c.cm. glycerine once a day. This method of treatment is specially useful if the lochia has stopped. A speculum is passed, the cervix is cleaned and 20 c.cm. of glycerine is injected through an ordinary female catheter passed into the uterus.

Intramuscular injection of 5 grains of *quinine* every other day has also been recommended.

If the blood shows a poor leucocytic response injections of sodium nucleate may be good.

Prontosil

It is a chemotherapeutic agent for streptococcal infection and very encouraging results have been reported by certain German observers. This has recently been confirmed by Colebrook (1936). I used it in 15 bad and moderately severe cases: there were no deaths.

One ampoule is injected intramuscularly two to three times a day. At the same time one to two tablets or more are given three times a day. The tablets are chewed after meals with plenty of water. The amount given by injection may have to be increased to 60 to 90 c.cm and may have to be repeated depending on the seriousness of the illness and condition of the patient. Generally not more than 20 c.cm. are required each day combined with oral administration as indicated above.

When the fever subsides and general condition improves, treatment may be continued with tablets alone.

The occasional occurrence of reddish urine following the administration of prontosil is due to the excreted dye-stuff and has no pathological significance.

Blood transfusion

Of all the life-saving methods of treatment that have been introduced in medicine in the last few years, blood transfusion stands out pre-eminent. Even in obstetric practice it has proved so valuable that we thought it advisable to include a detailed description of the technique in the latest edition of the textbook of midwifery with which my name is associated. It is exceptionally useful in severe puerperal septicæmia, specially those cases associated with anæmia. Even a small quantity of blood (100 c.c.) will produce a splendid effect. Not more than one pint need be given at a time, but it has to be repeated as often as is necessary.

Blood transfusion is not a difficult operation and, in my opinion (Dutta, 1936), can be carried out even in a rural dispensary and without any special instrument, particularly if small quantities are required. In a town where assistants are always available it can easily be carried out in private practice. Only one thing one has to be certain of and that is, being able to test the compatibility of the bloods. This is easy for one who has seen blood grouping done by a competent person.

Operative treatment

It is beyond the scope of this paper to enter into detailed description of different surgical procedures and their indications. It should however be remembered that draining the pouch of Douglas by posterior colpotomy is very useful when there is a collection of fluid in the pouch; also that a pelvic abscess should be opened just above the inguinal ligament.

In a serious case, an operation like hysterectomy or ligature of the ovarian vein will kill the patient, whereas mild cases will recover without any operation. Hysterectomy is only indicated in cases of abscess in the wall of the uterus, sloughing fibroid and ruptured septic uterus.

IV. Post-abortal and puerperal gas gangrene

Special mention of the above infection is necessary. The infection, as I have already stated, is not very uncommon and with better knowledge and more thorough bacteriological diagnoses it may be possible to find out the frequency of the infection in this country. Recently Hill (1936) reported 30 cases occurring in one hospital within two years, so it

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appears that it is far more common than we think it to be.

Source of infection.—This is generally from the rectum. Fæcal contamination is very liable to occur after an enema. In post-abortal cases, criminal abortion is a fruitful cause.

The organisms can be grown from the hands of medical attendants after washing and drying, less often after thorough scrubbing, and in some instances after thorough scrubbing and putting on wet sterilized gloves (Hill). That is why I have particularly mentioned the avoidance of fæcal contamination of the hands, thorough scrubbing and putting on of the gloves in the right way.

Symptomatology.—This may be considered under the following headings :—

(*i*) General and local signs of sepsis.

(*ii*) Jaundice, most marked in the face and body, least in the legs. It comes on early, develops rapidly and quickly and is soon followed by—

(*iii*) Cyanosis, specially of the fingers and toes. Absence of cyanosis is a good omen.

(*iv*) Pulse rises quickly to about 140, is of low tension, soft and running. Signs of peripheral circulatory failure are present.

(*v*) Temperature varies between 100 and 102.

(*vi*) Urine is very small in quantity, and a sample may have to be obtained by catheter for examination. It is of port-wine colour, containing hæmoglobin, methæmoglobin and red-blood cells debris. Albumen is always present. The disease practically always ends in renal failure.

(*vii*) Blood serum is of Burgundy colour due to hæmolysis.

(*viii*) Within a few days the skin becomes very dark and the conjunctiva may assume a chocolate colour.

(*ix*) The placenta is dirty pinkish-grey colour, soft, friable and spongy. The syndrome develops with amazing speed. It may be retarded or modified, but is only exceptionally arrested by therapy.

Diagnosis.—It is very difficult to diagnose puerperal cases early. The symptomatology is not evident till the very end, and, as it is often associated with a dead child or toxæmia, it is further obscured.

Jaundice, increasing pulse rate out of proportion to an evident pathological lesion, sudden collapse, increasing pain of the uterine muscle may indicate the lesion.

In severe and late cases gas crepitus of the lower abdomen may be evident.

Treatment.—Prophylactic—20,000 to 40,000 international units of gas gangrene serum.

Curative—total hysterectomy in early cases.

Forty thousand units of serum should be given intramuscularly as soon as it is diagnosed and repeated every 12 hours for at least three days. In grave cases a dose of 40,000 to 60,000

(*Continued at foot of next column*)

AN APPARATUS FOR THE DISTRIBUTION OF ANTIGEN EMULSION IN THE KAHN TEST

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and

B. TIMOTHY

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FOR testing every sample of blood the Kahn antigen emulsion has to be distributed in three varying volumes with the Kahn pipette. When a number of tests have to be performed, the time, labour and eye-strain involved in carefully transferring the antigen emulsion to the bottom of each tube are factors which require to be considered.

The Kahn antigen emulsion does not remain homogeneous; when kept for more than a minute or two, the particles settle down unless the emulsion is constantly stirred up.

Donald's drop method used in the Wassermann test was found unsuitable for the Kahn test. The particles in the emulsion separated out and clogged the fine end of the delivery tube. An ordinary Wright's pipette with the tapering end calibrated to deliver 0.125 c.cm. per drop and with which small volumes of antigen could be taken at a time was found

(*Continued from previous column*)

units has to be given intravenously and repeated daily for two or three days.

To prevent renal failure glucose and calcium gluconate should be given intravenously with normal saline.

Blood transfusion is indispensable for saving the patient with hæmolysis.

Plenty of fluids with alkalies should be given by the mouth.

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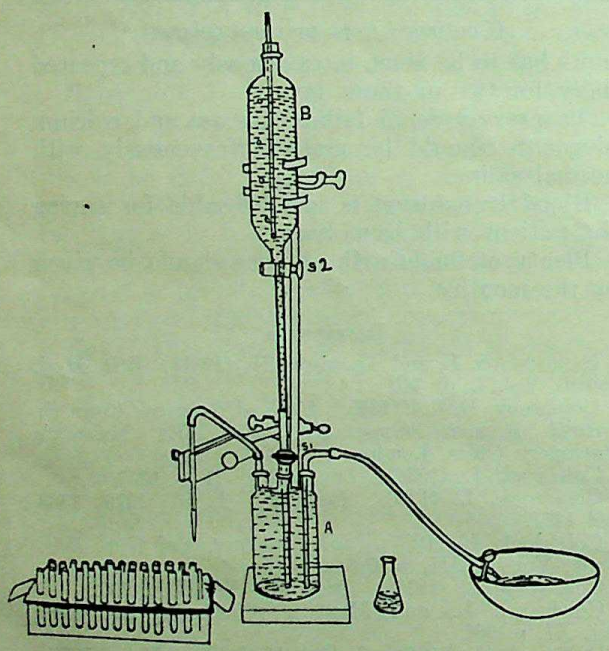
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unsatisfactory. The emulsion, being heavy, flowed down too rapidly and the rate of dropping was not easily controlled. To overcome this, a bend was made just above the delivery end to give the pipette the shape of a bayonet. This bend produced a throttling effect on the flow of the antigen emulsion. With such a pipette, which was good enough for a small number of bloods, and ensured speedy distribution of the antigen emulsion, the rate of flow of the drops was not always uniform, especially towards the end of a series of tests when the finger muscles were naturally fatigued. It was, therefore, thought that a mechanical device for dropping the emulsion would be good.

An apparatus, the details of which are given below, was devised for this purpose. By means of this the antigen emulsion could be sucked up into a pipette in small quantities at a time and delivered in regulated drops by means of hydrostatic pressure. (For this suggestion we are thankful to Mr. Sukumaran, Lecturer in Electrical Engineering, Engineering College, Guindy.)

The apparatus consists of :

(1) A Woulfe's bottle with three necks and ground-in stoppers. The side necks have one delivery outlet and one syphon tube attached respectively (marked A in the diagram).



An apparatus for the distribution of antigen emulsion in the Kahn test.

(2) A separating funnel fitted with two stop-cocks one below the other and passing through the central neck of the Woulfe's bottle. The mouth of the separating funnel is fitted with a rubber stopper through which a Marriot's tube is passed (marked B in the diagram).

The apparatus is fitted as in figure. Care should be taken to see that all connections and stoppers are quite airtight. The Woulfe's bottle and the separating funnel are filled with tap water. The delivery pipette, which is drawn out to deliver 0.125 c.cm. of antigen emulsion per drop (the outer diameter of the end to fit into no. 54 Starret's drill and wire gauge), is attached to the delivery tube of the Woulfe's bottle by a short length of rubber tubing. The pipette is held vertically in position by a wooden clamp as shown in the figure, just high enough to allow the racks of tubes to pass under to receive the drops of emulsion. The syphon arrangement is fitted as in the figure. To set the syphon into action, close the delivery end of the bottle, open both stop cocks (S_1 and S_2) and press the pinch cock at the end of the syphon tube. This drives the water in the bottle to fill up the syphon tube and set it working. On releasing the pinch cock, the syphon remains closed.

The antigen emulsion having been prepared in the usual way, is sucked up into the pipette (about 1 c.cm. at a time) as follows :—

The vial containing the antigen emulsion is brought under the pipette so that the tip of the latter dips into the emulsion. The syphon is released by pressing the pinch cock and the antigen emulsion will rise up in the pipette. When sufficient amount has been sucked up, the pinch cock is released. The fluid remains held up in the pipette.

The lower stop cock of the separating funnel (S_1 in figure) is now opened fully. By adjusting the upper stop cock (S_2 in figure) the flow can be regulated to obtain the proper speed of dropping of the antigen emulsion, slow enough to receive the drops into the tubes without spilling out. Having adjusted this, the lower stop cock is closed. The racks holding the test tubes are now held under the delivering pipette, the lower stop cock S_1 is opened, and the racks moved slowly to bring the tubes one after another under the pipette to receive the drops. Into the first row one drop is delivered. Into the second row two drops, into the third row four drops. When the charge of antigen in the pipette is finished, it may be recharged as described above.

Certain precautions are to be observed in the working of the apparatus. All connections should be airtight. The Woulfe's bottle should be completely filled with water and the air space that occurs in the bottle by working the syphon should be kept reduced to a minimum. The stem of the separating funnel should be completely filled with water. To the water in the apparatus, some antiseptic may be added to prevent the growth of algæ, for only very small quantities of water are wasted whenever the apparatus is worked, and the water need not be replenished for some weeks.

The apparatus is very simple, accurate and labour saving. It can be fitted up in any laboratory and requires very little practice to work.

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THE RARITY OF THE MALE *ENTEROBIUS VERMICULARIS*

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IN the progress of an investigation we were struck by the frequency with which we encountered male threadworms; this tempts us to write this short note. Many books mention that the male threadworms are 'rare', are 'infrequently found', are 'fewer', etc., clearly indicating that they are rarely seen. Our investigations have been confined to the vermiform appendix. We are publishing separately our findings in respect of different aspects of the condition of the vermiform appendix.

The material for investigation came from two sources :—

(1) From the operation theatre.

(2) From the post-mortem room.

The frequency of male threadworms has been noted.

The technique followed is as follows :—

As soon as the body is opened the appendix is lifted by gently holding its tip, the mesentery is separated, and a tight ligature tied round its broad receding base. It is then received in a Petri dish. It is slit open along the mesenteric attachment. The contents are carefully viewed.

The female threadworms are a contrast to the males in every respect—they are straight with sharp-pointed extremities, opaque white and comparatively rigid. These give the clue to the material being useful for investigation. Small particles of fæcal contents are then carefully emulsified in clear saline and tiny transparent hooked small mucinous objects are picked up by sucking fluid by pipettes. These invariably turn out to be male threadworms. We have not failed so far in finding males in any specimen. The numbers in some have been large. In one appendix we found over 12 males in only part of the contents. In that case the bowel contents had shown 36 females. We have not investigated in the same manner stools or intestinal contents from post mortems. It is our impression that the characters of the threadworm are probably more responsible for the reported rarity. They are very tiny, transparent, and often embedded in fæces. In one appendix we found three males coiled together in one fæcal clump of the size of a loopful. The male worms are further very fragile.

We are venturing to publish this note in order that other workers in the post-mortem room may confirm our observations.

SERUM COMPLEMENT IN RELATION TO VITAMIN-C DEFICIENCY IN GUINEA-PIGS

By R. K. CHAKRABORTY, M.SC.
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MARSH (1936) observed that the complement titration values of the serum of guinea-pigs decreased very considerably when vitamin C was withdrawn from the food of the animals. When diets rich in vitamin C were supplied to them, the concentrations of the complement in the serum came up to the original values and sometimes even higher. Marsh concluded that vitamin-C deficiency causes a marked fall in the concentration of serum complement.

It seemed to us of interest to investigate this serological problem further in relation to the studies on the biochemical function of vitamin C with which we are engaged. After this work had been completed, a paper by Zilva (1936) appeared in which he was unable to confirm the results of Marsh. Our experiments were planned somewhat differently. It was observed by Guha and Ghosh (1935) that the guinea-pig embryo in the early stages of its development could apparently synthesize vitamin C, an observation which was in accord with the findings of Bourne (1935) that pregnant guinea-pigs get scurvy more slowly than non-pregnant guinea-pigs, when they are placed on a scorbutic diet. Accordingly, we wished to study the changes of serum complement, if any, in vitamin-C deficiency in relation to sex and to the state of pregnancy. Thus, three groups of guinea-pigs consisting of male, female (non-pregnant) and female (pregnant) were chosen. The titration values of the complement of the guinea-pigs were obtained when the animals were on normal diet (gram and green grass). Then each guinea-pig was fed on a scorbutic diet containing 80 per cent gram and 20 per cent oats for a period of 12 days and 2 mg. of pure ascorbic acid were fed daily during this period and then their complement values were determined. The animals were then placed on the scorbutic diet alone for a period of 20 days and the complement titration values of each guinea-pig were determined on the 12th and 20th days, after their being put on this scorbutic diet.

Before proceeding with the titration of the complement, the hæmolysin unit was first determined every day and two units of hæmolysin were used in the titrations of the complement. The serum of the guinea-pigs, for the complement estimation, was made into different dilutions such as 1/4, 1/6, 1/8, 1/10, etc., up to 1/40 and 0.3 c.cm. from each dilution was taken at the time of experiment.

In these titrations the hæmolytic system in each tube consisted of :—

(*a*) Red blood cells (sheep's)—0.5 c.cm. of 2 per cent suspension.

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(*b*) Hæmolysin used—0.5 c.cm. of two units.
(*c*) Serum (of which the complement was to be determined)—0.3 c.cm. of different dilutions.

One c.cm. of normal saline was added to each of the tubes so that the final volume in each case was 2.3 c.cm. The tubes were then incubated on a water bath at a temperature of 37°C. for half an hour and the values were noted. Control experiments were made side by side with (1) sheep's cells *plus* hæmolysin, (2) sheep's cells *plus* saline and (3) sheep's cells *plus* complement but no hæmolysis occurred in these control tubes.

The following table shows the dilutions of the serum where complete hæmolysis took place when the guinea-pigs were kept on different diets :—

Serial number	(a) When the animals were on normal diet	(b) After 12 days feeding of 2 mg. of ascorbic acid *plus* vitamin-C deficient diet	(c) After 12 days on vitamin-C deficient diet	(d) After 20 days on vitamin-C deficient diet
	Male guinea-pigs			
1	1/10	1/10	1/10	dead
2	1/20	1/20	1/16	1/16
3	1/8	1/8	1/8	dead
4	1/20	1/20	1/20	1/20
5	1/20	1/20	1/20	1/16
6	1/20	1/20	1/20	1/20
	Female (pregnant)			
1	1/16	1/16	1/16	1/16
2	1/10	1/10	1/10	1/10
3	1/8	1/8	1/8	1/8
4	1/8	1/8	1/8	1/8
5	1/16	1/16	dead	dead
6	1/5	1/5	dead	dead
	Female (non-pregnant)			
1	1/8	1/10	1/8	1/8
2	1/10	1/10	1/10	1/10
3	1/10	1/10	1/10	1/10
4	1/10	1/10	1/10	1/8
5	1/8	1/10	dead	dead
6	1/5	1/5	dead	dead

The results indicate that in each batch of six guinea-pigs, there is a slight reduction of complement only in two cases among the males, only in one case among the non-pregnant females and in no case among the pregnant females. It appears, therefore, that in vitamin-C deficiency the serum of guinea-pigs hardly suffers a reduction of the complement; nor is there any material sex-difference in this respect.

My thanks are due to Drs. B. C. Guha, J. C. Ray and H. Ghosh for advice and help.

(*Continued at foot of next column*)

THE PROTEIN AND MINERAL VALUES OF SOME COOKED BENGALI DIETS

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and
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DURING recent years much attention has been concentrated on the nutritional level of large communities and on the nutritive values of diets consumed by them. Work has chiefly proceeded on three lines—(1) the measurement of the physical indices of the nutritional conditions of the people, (2) the measurement of the prevalence of deficiency diseases, and (3) the estimation of the food values (mainly protein, mineral and vitamin values) of the diets as indicated by their daily or monthly purchases of raw food materials. The deficiencies so ascertained have been sought to be remedied by incorporating in the diets foodstuffs, whose nutritive values, again, have usually been determined in the raw state. Sir John Orr (1936), for instance, has recently published an instructive monograph in which the consumption of essential food ingredients by sections of the British people has been computed from a survey of their budgets concerning the purchase of raw foodstuffs. It would appear that, while such estimates are very useful, more precise and practical information would be obtained if the actual cooked diets, as they are consumed, are evaluated with regard to their nutritive values. Cooking would doubtless alter the food values considerably.

Sir Robert McCarrison's pioneering work in this direction concerning the growth-promoting values of diets consumed in different provinces in India, as determined by the growth of rats, first drew attention to the defects of some of these diets. Guha's results (1934), obtained with the cooked diets obtained from a middle-class young men's hostel in Calcutta, also pointed to partial vitamin-A and -B deficiency in these diets. In this connection, it should be mentioned that, recently, results obtained with experimental animals have, with a certain degree of justification, been criticized with regard to their applicability to the human. On the other hand, it should be realized that metabolic experiments on the human, unless they are carried out with a reasonably large number of subjects, which it is difficult to do for obvious reasons, are apt to be very misleading, owing to the great individual variations

(*Continued from previous column*)

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between man and man. With experimental animals, however, a large number of experiments can be carried out and the results are comparable among themselves. Both methods are open to criticism, but the more reliable method would seem to be to use experimental animals and then to check the results with human subjects. Thus, the value of milk as an article of diet has long been established with experimental animals and Corry Mann's extensive experiments (1926) on the feeding of milk to the young people in educational institutions in Great Britain have confirmed this idea.

In the present work we investigated the protein, calcium, phosphorus and iron contents of the cooked diets consumed in (1) seven middle-class Bengali families in Calcutta, (2) two hospitals and (3) two students' hostels attached to Colleges, in order to obtain information about the intake of these essential dietary constituents in average families, hospitals, and hostels. Although it is generally recognized that the diet of the Bengalis is relatively poor in protein and perhaps also in some minerals, precise analytical data concerning the cooked diets are lacking. The present paper is in the nature of a preliminary report and more extensive investigations are in progress.

EXPERIMENTAL

The different items of the cooked diet were taken in the proportions of rice 100 g., dâl (aqueous decoction of pulses) 25 g., fish curry 15 g. and vegetable curry 20 g. These are the proportions in which these items are taken by middle-class people in Bengal. These were mixed up intimately in a dish; aliquot portions (3 to 5 g.) of this mixture were taken for protein estimation and the remainder was dried in an air oven at 100° to 105°C.

The protein content was estimated by the usual Kjeldahl's method of estimating nitrogen and by multiplying this value by the factor 6.25.

For the estimation of iron, calcium and phosphorus, the above dried diet mixture was ignited in a silica crucible and turned to ash completely. The ash was taken up in dilute hydrochloric acid and any insoluble residue was filtered off. The filtrate was made up to a known volume.

Aliquots of this solution were used for the determination of iron, calcium and phosphorus.

Estimation of iron.—Iron determination was carried out by the method of Elvehjem (1930). Ten c.cm. of the above solution were taken, made distinctly alkaline with 40 per cent sodium hydroxide (iron-free), and boiled for an hour. This was cooled, made acid with dilute hydrochloric acid and diluted to a volume of 50 c.cm. The colorimetric estimation was then carried out as outlined by Kennedy (1927). One c.cm. of the standard iron solution equivalent to 0.1 mg. of iron was mixed with 5 c.cm. dilute hydrochloric acid and diluted to 50 c.cm. Aliquot portions (10 c.cm.) of the standard and of the unknown were placed in stoppered cylinders, 10 c.cm. of amyl alcohol and 5 c.cm. of 20 per cent potassium thiocyanate were added in each cylinder and the mixture was thoroughly shaken. The coloured layers of amyl alcohol were then compared in a colorimeter.

Estimation of calcium.—A known volume of the ash solution was made just alkaline with ammonia, excess of 20 per cent ammonium acetate (10 c.cm. to 15 c.cm.) was added to it and the solution was freed from phosphates by means of dilute ferric chloride. This was filtered and washed with 1 per cent ammonium acetate. The filtrate and washings were boiled with 2 to 3 g. ammonium chloride. One to 2 g. of oxalic acid crystals were added to the boiling solution with continual stirring, a few drops of strong ammonia and a sufficient quantity of 3.5 per cent ammonium oxalate solution were added while the stirring was continued. The precipitate of calcium oxalate was filtered, washed free from chloride with 1 per cent ammonium oxalate solution and burnt to calcium oxide in a silica crucible. The above method was adopted from that of Richards, McCaffrey and Bisbee (1901). The calcium was calculated as calcium oxide.

Estimation of phosphorus.—The method adopted was that of Burns and Henderson (1935). An aliquot portion of the ash solution was taken; 5 c.cm. to 10 c.cm. of concentrated nitric acid were added to it, which was followed by 20 c.cm. to 30 c.cm. of 34 per cent ammonium nitrate solution and finally 70 c.cm. to 80 c.cm. of 3 per cent ammonium molybdate solution were added. The solution was heated and the precipitate of ammonium phosphomolybdate allowed to settle. The precipitate was filtered and freed from acid by washing with hot water. The precipitate was then dissolved in a known volume of 0.5 N sodium hydroxide solution and the excess of alkali titrated with 0.5 N hydrochloric acid, phenolphthalein serving as indicator. One c.cm. of 0.5 N sodium hydroxide was equivalent to 0.675 mg. of phosphorus.

In the two principal meals, Bengalis generally take the same diet and in this work it was assumed that they take the same quantity also. The Bengali middle-class adult was thus supposed to take 1,480 g. in the two principal meals (Guha, 1934). The total quantities of iron, calcium, phosphorus and protein were calculated as they were present in this total quantity of 1,480 g.

The refreshments, tea, milk, etc., taken in addition to the principal meals, were not taken into account.

The quantities of iron, calcium, phosphorus and protein consumed per day by an adult are given in the table.

Discussion

The figures given in the table show that the consumption of these dietary constituents by an average adult per day is comparable among the middle-class families, hospitals and hostels in Calcutta. Stiebeling (1933) of the Government Bureau of Home Economics, U. S. A., gives standard figures for consumption per head per day as follows : protein 68 g.; calcium oxide 1.21 g.; phosphorus 1.23 g.; iron 13 to 14 mg. Comparing the mean values of the family, hospital and hostel diets obtained in the present set of experiments, *viz*, protein 56.26 g.; calcium oxide 0.89 g.; phosphorus 1.10 g.; iron 55.6 mg.; it would appear that, so far as the present figures go, the consumption of iron is more than optimum, while the consumption of calcium is

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TABLE

Family number	Days	Iron in mg.	Mean value	Calcium oxide in g.	Mean value	Phosphorus in g.	Mean value	Protein in g.	Mean value
1	1	28.12	60.83	0.71	0.65	0.82	0.86	60.38	58.73
	2	116.77		0.36		0.71		51.99	
	3	36.85		0.84		1.07		63.83	
2	1	48.10	92.64	0.87	0.67	2.09	2.13	55.50	55.50
	2	137.19		0.48		2.18		55.50	
3	1	43.07	47.57	1.19	0.90	1.22	1.31	47.51	51.01
	2	37.74		1.08		1.54		55.35	
	3	61.91		0.45		1.18		50.17	
4	1	23.12	18.41	1.31	0.87	1.33	1.12	46.47	56.71
	2	15.54		0.16		1.03		55.35	
	3	16.58		1.14		1.02		68.31	
5	1	49.88	58.66	1.52	1.24	1.59	1.53	50.91	51.60
	2	54.32		0.41		1.66		54.91	
	3	71.78		1.81		1.35		48.99	
6	1	50.62	50.94	1.52	1.15	0.85	0.89	47.06	49.28
	2	44.10		0.40		0.81		49.58	
	3	58.12		1.54		1.01		51.21	
7	1	81.55	66.98	1.87	1.22	1.17	1.03	55.94	51.33
	2	63.30		0.35		0.87		53.35	
	3	56.09		0.47		1.07		44.70	
Mean value of all the families.			56.57		0.95		1.26		53.45
Hospital number	Days								
1	1	69.76	66.63	0.54	0.77	1.08	1.10	63.21	61.33
	2	63.48		1.01		1.13		59.45	
2	1	53.26	50.45	0.98	0.95	0.88	1.07	55.65	55.12
	2	48.99		1.21		1.11		48.78	
	3	49.12		0.67		1.23		60.93	
Mean value of the hospital diets.			58.54		0.86		1.08		58.15
Hostel number	Days								
1	1	43.00	39.44	0.71	0.79	1.13	0.97	57.65	56.08
	2	39.35		0.54		0.93		61.34	
	3	35.98		1.13		0.87		49.27	
2	1	54.39	63.97	1.18	0.98	1.03	0.99	56.38	58.30
	2	63.15		0.78		0.91		51.16	
	3	74.39		0.99		1.03		67.38	
Mean value of the hostel diets.			51.70		0.88		0.98		57.19
Mean value of the family, hospital and hostel diets.			55.60		0.89		1.10		56.26

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about 25 per cent lower and of phosphorus slightly lower. The consumption of protein is also lower and, when it is considered that the bulk of the protein again is derived from vegetable sources, a deficiency in the consumption of adequate amounts of protein of high biological value is indicated. It should be stated that though the consumption of iron appears to be high, it is not clear what proportion of this is present in the assimilable form. It should, however, be remembered in this connection that Stiebeling's standards might quite conceivably be inapplicable to India. But, although there has been discussion on the subject, the actual standards applicable to Indian conditions have not yet been worked out.

Summary

Analyses have been carried out of the cooked diets consumed in seven middle-class families, in two hospitals, and in two hostels in Calcutta. The results are remarkably similar among these three groups. A comparison of these figures with Stiebeling's standard figures indicates a low consumption of calcium and of protein of good biological value in the present observations. On the other hand, the consumption of iron seems to be higher than the standard value and that of phosphorus only slightly lower.

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A Mirror of Hospital Practice

COMBINED MYOPATHY AND NEUROPATHY

By K. D. MANOHAR, M.D. (Bom.)

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MYOPATHY is not a lesion commonly met with in the post-mortem room. Although a slowly progressive disease beginning in childhood, myopathy hardly permits its victim to reach such an advanced age as to develop neuropathic lesions of a vascular nature such as were found in the case studied which is the first noted in the pathology school, Grant Medical College, since 1920.

A male, aged 45, was brought to the hospital, emaciated, unconscious and with spasm of the right side of the body. No history could be obtained. The head was asymmetrical, the left side of the chest, arm and forearm were shrunken and there was an old fracture deformity of radius and ulna. The hand was in a good state of nutrition, there being no atrophic changes.

The right lower limb was 10 cm. shorter than the left, and the calf was 4 cm. less in diameter. The blood vessels were thickened and tortuous; blood pressure was 148 systolic and 96 diastolic. Ophthalmoscopy showed retinal hæmorrhages and choked disc on the right side. The patient died without regaining consciousness.

Post mortem.—The skin of the left upper limb was thinned and parchment-like. Well-marked arcus senilis was present. The blood vessels in the limbs were thickened but not blocked at any part of their course.

The kidneys were granular, red and small. The cut surface showed excess of pelvic fat and narrowed cortex and medulla, and a number of fibrous bands were present.

Heart moderately hypertrophied, the left ventricle showing distinct hypertrophy as well as dilatation. Coronary vessels patent; musculature normal. The whole length of the aorta showed extensive and severe atheroma with plaques of calcification and soft vegetations.

The skull cap was asymmetrical and thickened, the left half being 5 cm. less in circumference than the right, and excess of fluid escaped on opening the dura mater. A bony plate projected into the cranial cavity from the left orbital roof, forming an empty cyst 7 cm. in depth and 3 cm. in height. This space did not communicate with the frontal sinus or the orbit. The left cerebral hemisphere was atrophied and covered with thick and opaque pia-arachnoid. The blood vessels were thin but not obviously obliterated.

The right internal carotid artery showed obvious calcification of the coat and narrowing of the lumen. Extensive recent hæmorrhage had ploughed up the basal ganglia and the capsular region.

The spinal cord, brain stem and cerebellum showed no gross abnormality.

In the face, the orbicularis oculi and oris were dull white in colour but not distinctly yellow nor greasy to the feel. The extrinsic muscles of the eye and the other muscles of the face and tongue were normal. The muscles of the neck were normal, except the trapezius and the sternomastoids. The muscles of the trunk and diaphragm were normal. In the lower limbs there was a fatty mottling of all muscles on the right side, but this mottling was distinct in appearance from the uniform dull white colour of the affected muscles in the upper limbs. The muscles of the right lower limb were also distinctly more greasy than the muscles in the upper limbs or other healthy muscles of the body.

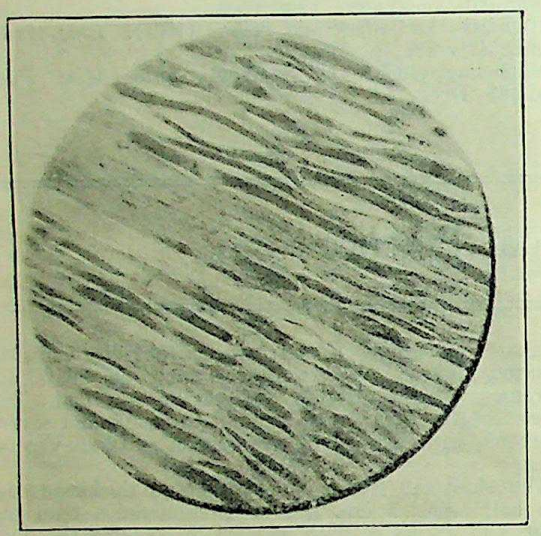
The muscles of the left upper limb had undergone a marked atrophy. The pectorals, rhomboids and serratus anterior could be well defined, but were much smaller than those of the right side and were dull white in colour. The trapezius showed a number of healthy deep brown muscle bundles interspersed with dull white fibres. In the arm only the belly of the biceps had

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persisted as a well-defined muscle but it was of dull white colour. All the muscles of the forearm were completely atrophied, but the intrinsic muscles of the hand were well preserved.

The atrophy was less marked on the right side. Some muscles showed healthy fibres alternating with degenerated fibres and all the muscles were well defined. The trapezius, lavator scapulæ, and serratus anterior had undergone complete degeneration while the latissimus dorsi, rhomboids, supraspinatus and infraspinatus showed partial degeneration. The teres major and minor were healthy and the subscapularis were completely degenerated. The coracobrachialis and triceps showed complete degeneration; the deltoid, biceps and brachialis anterior showed partial degeneration. In the forearm, pronator teres and quadratus, flexor carpi radialis, palmaris longus, brachioradialis, and anconeus had undergone complete degeneration, and the other muscles were normal. In the palm, flexor pollicis brevis, adductor pollicis and short flexor and extensor of the little finger had degenerated, the other short muscles were healthy.



Photomicrograph showing fragmentation of muscle bundles and cellular invasion of sarcolemma.

Histological examination of the muscles showed pale, homogeneous, stained fibres alternating with very large, deeply-stained bundles. The fibrous sheath was prominent and there was a distinct multiplication of nuclei as well as mononuclear and giant-cell infiltration. The more degenerated muscles showed fibrous tissue replacement but fatty vacuolation was not prominent.

Creatine estimation was carried out; the control healthy muscle showed a creatine percentage of 150 mgm. per cent, and the muscles from this case failed to show more than a trace of creatine.

Direct staining for creatine was done by immersing pieces of normal, neuropathic muscles and portions of muscles from the present case, in solution of picric acid in 10 per cent sodium hydroxide. The normal muscle took on a deep mahogony colour, the neuropathic muscle showed a few healthy muscle bundles which took on a deep colour while the muscle from the present case remained pale yellow.

Thanks are due to Dr. Patwardhan, Professor of Biochemistry, G. S. Medical College, for undertaking the creatine estimation, and to Prof. V. R. Khanolkar, Professor of Pathology and Bacteriology, G. S. Medical College, for supplying histological specimens of biopsy material from myopathic patients.

MULTIPLE STONES IN THE BLADDER

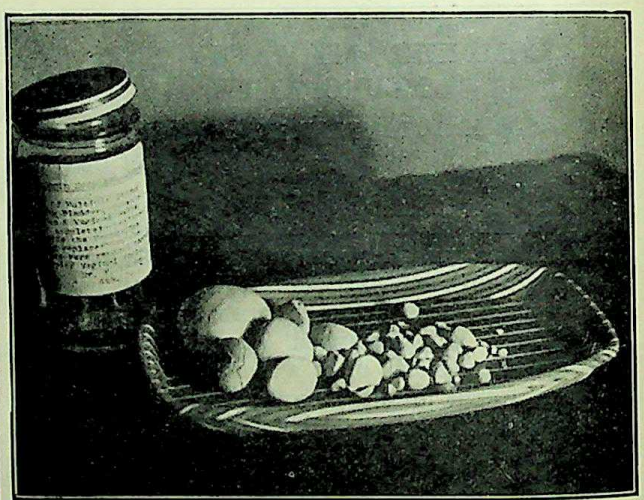
By D. K. FAIRBAIRN KHUSRO, M.R.C.S., L.R.C.P., M.B., CH.M., L.M.

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A WOMAN, 65 years old, came to the Dufferin Hospital, Aligarh, from her village, 40 miles off, complaining of difficulty in micturition of a year's duration, and 'falling of the uterus', which she first noticed 5 years previously.

On examination there was found complete prolapse of the uterus with inversion of the vaginal walls. The external os was seen at the tip of the prolapse and a small atrophied uterine body was felt above and behind it. On palpation of the inverted anterior vaginal wall a number of stones of different sizes were felt in the bladder; some appeared to be very large. A sound could not be passed into the bladder further than half an inch, as it seemed to be full of stones, while the prolapsed uterus could not be replaced owing to obstruction by the stones. There was more or less continuous dribbling of foul-smelling urine, which contained albumin and pus.

The patient was aged, feeble and emaciated. Preliminary treatment with urinary antiseptics was carried out. The suprapubic route was found impassable, so an incision was made in the prolapsed anterior vaginal wall into the bladder. A number of stones, seventy-six in all, were removed; they varied in size from a pea to that of a hen's egg, and were phosphatic in character. The largest weighed 1½ ounces and all of them together, 4 ounces.



The uterus was replaced and the wound sewn up in layers. Operation for prolapse could not be done owing to the feeble condition of the patient and the septic state of the bladder. She made a good recovery and decided to return to me for the prolapse operation in the cold weather. In the meantime a ring pessary was inserted to keep the uterus up and the patient allowed to go home.

CARBUNCLE COMPLICATED WITH ERYSIPELAS

By HANS RAJ, M.B., B.S.

Physician and Surgeon, Ferozepore City

R. R., male, aged 60 years, came with a large carbuncle, about six inches in diameter, on the back, on the 10th August, 1936. The carbuncle was covered

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with dirty dressings; it was discharging pus and contained large sloughs. The patient had high temperature and complained of weakness. I advised operation, but he refused and went away taking some 'barber's' ointment with him.

He came back after eight days in a moribund condition with extensive erysipelas on the back, shoulders, front of the chest and abdomen. The temperature was high and pulse 128 per minute. The carbuncle was covered with dirty ointment and was still discharging freely.

I injected him at once with antistreptococcal erysipelas serum (Bayer) and prescribed an iron mixture.

The carbuncle was fomented and cleaned with boric compresses. The injections were repeated twice a day and antiseptic dressings and compresses were continued.

The rash began to disappear and the temperature came down in three days. By the end of the 7th day the erysipelas had disappeared, the wound cleared up rapidly and showed signs of healthy granulations. The iron mixture was stopped and Prontosil tablets (Bayer) were given by mouth. The wound healed up without operation more quickly than usual in such cases and the man was discharged cured in a month.

It is interesting to note that the wound, previously unhealthy, full of pus and sloughs and riddled with openings, manifested marvellous recuperative power and dried up quickly, after the erysipelas abated.

A MELANOTIC SARCOMA OF THE ANAL REGION

By NAND LAL BAJAJ, L.S.M.F. (Hons.)
In charge, Civil Dispensary, Barsar, Kangra District

S. R., aged 74, male, was admitted into my dispensary for the following complaints :—

(*i*) Frequency of and difficulty in defæcation.
(*ii*) Inability to sit down.
(*iii*) Discharge of blood and mucus in stools.
(*iv*) Frequency of micturition.

These symptoms began about four years ago but the man was relieved of them about 1½ years ago by an operation in this dispensary. The dispensary record showed that a tumour of the rectum was removed successfully but the relief lasted for only about a year.

Local examination.—A blind external fistula with thick hard margins on the left side of the anus was seen. There were a few black granules at the bottom of the fistula. Per rectum, a hard irregular mass chiefly occupying the posterior wall of the rectum and anus could be felt. It was continuous with the hard mass forming the fistula outside the anus. The growth was partly movable from side to side, and bled on examination. Hæmorrhoids were present. The prostate was enlarged and smooth. The inguinal glands were very slightly enlarged, freely movable, discrete and painless. Lumbar glands were impalpable.

Clinical examination of other parts of the body did not indicate any evidence of metastasis.

Under chloroform, after preliminary preparation, the sphincter ani was dilated and the tumour drawn out of the anal orifice and completely excised. It was about the size of an ordinary orange, irregular in shape, hard in consistency and dark purple in colour except a small patch which was black. The piles were ligatured and excised. The tiny mass with a fistula in it located outside the anus was removed as thoroughly as possible.

A fortnight after the above operation a black neoplasm as big as an almond and with three openings in it developed and had to be cut away with an area of the healthy tissue around it. The growth contained numerous tiny pigmented granules.

Both the tumours were sent for report to the bacteriologist to the Government at Lahore and the report received was 'melanotic sarcoma'.

The operation wounds having healed, the patient was discharged with advice to come to the dispensary from time to time for examination.

The points of interest in this case are the old age of the patient at which sarcoma appeared, non-occurrence of any apparent metastasis, non-involvement of the glands draining the part, the unusual site for sarcoma and lastly its peculiar spread into the rectal region.

A STONE IN THE PREPUCE

By S. K. SHRIVASTAVA, L.M.P.
In charge, State Hospital, Nagod, C. I.

A MALE, aged 30 years, came to the State Hospital, Nagod, on the 13th September, 1936, with the following complaints:—

1. Pain and burning during micturition.
2. Increased frequency of micturition and passage of urine only drop by drop.
3. Pus-like discharge from the organ.

Previous history.—For about four years he has had trouble during micturition and about a year ago he apparently had gonorrhœa with purulent discharge and severe burning pain during micturition. There was inflammation in the prepuce and phimosis.

Present condition.—General health good. There was phimosis and the prepuce was inflamed. On passing a probe into the orifice a hard body could be felt. The patient was prepared next day for circumcision. On slitting the prepuce a concretion about the size of a betel nut and weighing thirty grains was found. Circumcision was completed and a sound passed into the bladder to see if there were any calculi in it, but none could be felt.

The man was given copaiba-sandalwood oil mixture with bromide. On the sixth day after operation the sutures were removed, the wound healed by first intention and the patient was discharged cured on the 25th September, 1936.

My thanks are due to Lieut.-Colonel R. Kharegat, I.M.S., agency surgeon in Bundelkhand, Nowgong, C. I., who very kindly gave me permission to publish the case.

A CASE OF ACUTE INFECTIVE MYELITIS (INFLUENZAL) TREATED WITH MILK INJECTIONS

By B. H. SINGH, M.C.
LIEUTENANT-COLONEL, I.M.S.
Civil Surgeon, Burdwan

R. S. R., a police constable, aged 43 years, was admitted into the Police Hospital, Burdwan, on 18th October, 1935, with a temperature of 101°F.; he gave a history of exposure while on night duty on the 16th. He was discharged on 28th October, but was readmitted on the 6th November, complaining of some weakness in the legs, pain over the bladder region, frequent micturition and constipation. In this, the initial stage of the disease, he had pyrexia (100°F.), headache, malaise, sore throat and numbness with tingling in the lower extremities.

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He was transferred to Fraser Hospital, Burdwan, under Dr. G. C. Sarkar, on the 7th November for investigation and treatment. In the second phase of his disease (the pre-paralytic stage) he complained of weakness gradually spreading upwards in both legs and slight weakness of the arms as well. The fever had subsided but retention of urine was noted. This was soon followed by the paralytic stage or stage of actual invasion of the central nervous system, and paralytic phenomena appeared. The localization of the lesion was noted to be in the lower dorsal region. He had by this time lost all motor functions of the lower limbs, but he could raise his hands and move his arms. The upper part of the body was quite free from paralysis. The palate, the pharynx, the larynx, and the grip of the hands were all unaffected. There was slight loss of sensation to pin prick and light touch tests in both legs, and an indefinite hyperæsthenic zone corresponding to the lower dorsal region was present (girdle pain). The knee and ankle reflexes were exaggerated and Babinski's extensor response was positive. The triceps and biceps reflexes were either normal or slightly exaggerated. The Wassermann reaction was negative. The blood count showed moderate leucocytosis—12,000 per c.mm., polymorphonuclears—75 per cent, small mononuclears—18 per cent, large mononuclears—6 per cent, eosinophils—1 per cent and other cells nil.

Treatment.—The patient was put in a soft bed and proper precautions were taken to avoid the development of trophic lesions such as bed-sores. He was catheterized every 8 to 10 hours, and an enema given daily for constipation, as a routine. When evidence of cystitis appeared, urinary antiseptics, neotropine, urotropine, etc., were administered and a bladder wash with permanganate of potash lotion given. Potassium iodide in moderate doses was given a trial, but the patient took an unfavourable turn. He was showing signs of increasing toxæmia and becoming drowsy with moderate pyrexia (100°F.). By this time, and in spite of strict vigilance, bed-sores appeared, and the patient was rapidly going down hill and was in a very serious state.

At this stage it was decided to try non-specific protein therapy by milk injections. The initial dose of 3 c.cm. was given intramuscularly into the buttock on the 18th November, *i.e.*, 11 days after admission into the Fraser Hospital. The first injection made no appreciable change, and a second injection of 5 c.cm. was given three days later. The bladder irrigation was kept up, but the other accessory treatments were all omitted. The response after the second dose was somewhat encouraging; he could now feel fulness of the bladder—certain evidence of return of the vesical reflex. Encouraged by this a third injection of 5 c.cm. was given after three days, and it was noted that he could slightly move the toes. The general outlook also was brighter, the toxæmic signs were less obvious than before, and except for the re-active rise of temperature after the injections, the temperature was now normal. A fourth injection was given, and after this the bladder showed a return to voluntary power and catheterization was no longer necessary. The treatment was continued and he gradually regained the power of his legs, his bed-sores healed and the girdle pain also subsided. Seventeen days after the first milk injection the patient could move his lower limbs. He was discharged on the 25th December, 1935, when he had just regained enough strength to stand with the help of sticks, as his people were very anxious to take him home.

The total quantity of milk administered in this case was about 33 c.cm. in 7 injections; all were given intramuscularly at intervals of 3 or 4 days. He was given 8 months' sick leave and when he returned from home in September 1936, he looked fit, but said that he still felt a little stiffness in his legs and could not run. He could, however, walk well, and sit and stand normally.

Milk therapy is much used in the Fraser Hospital, Burdwan, and my results in the reduction of malarial spleens have been recorded in the *Gazette* in September 1933. It has also been tried in several other conditions, with good results but we had never before tried it in a disease of this nature. This case is reported in order to draw attention to the possibility of using milk to raise the natural resistance of patients when their condition appears hopeless and they have failed to respond to ordinary treatment.

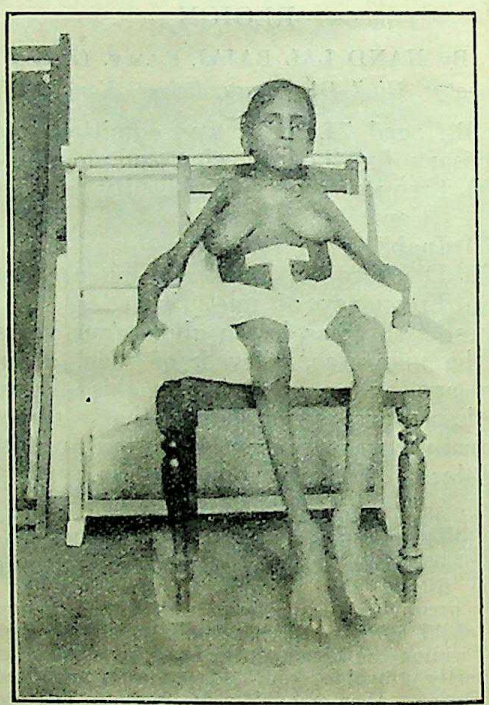
OSTEOMALACIA; TORSION OF THE PREGNANT UTERUS

By S. MOHD. ANWAR
Jubil Hospital, Amritsar

Case report.—A woman, aged 26, small and ill-developed, was delivered of a full-term child by Cæsarean section.

Previous history.—When a girl of twelve, she had a fall and has never walked properly since then. She was married at the age of fifteen and was delivered of a child by Cæsarean section three years later. She has had severe osteomalacia since then.

On examination it was found that both arms had been broken (*see* figure) and that the pelvis was so



distorted that natural delivery was impossible, so Cæsarean section was performed upon her for the second time. The uterus was long and narrow and the usual incision was made through what was taken to be its anterior surface, but after successful delivery of the child and on proceeding to sew up the incision it was found that the organ was twisted so that the scar of the previous operation was situated behind. On account of the impossibility of natural delivery ever taking place the woman was sterilized. She made a good recovery and the child appeared quite normal.

I wish to thank Lieut.-Col. Padaya, I.M.S., who was in charge of the case, for permission to publish this report.

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Indian Medical Gazette

JANUARY

MILK

THERE is no fact so obvious that it cannot be repeated again and again without advantage to someone, as, in a world where values are continually changing, even into the minds of the most balanced, doubt must always manage to creep sometimes. Further, there are writers and teachers with a paradoxical type of mind who consider that to repeat a truth is commonplace but delight in contradicting the teachings of established custom; these dangerous influences have to be counteracted continuously. No truth has been so firmly established by long human experience and so completely confirmed by recent scientific investigation, is so obvious and yet seems to need so frequent repetition as that which is contained in the sentence quoted from the League of Nations' Report on the nutrition problem—'milk is the nearest approach we possess to a perfect and complete food, and no other single food can be used as a substitute'.

Milk not only contains protein, fat and carbohydrates in very suitable proportions for human food but in each instance the nutritive constituent is in an ideal form for easy assimilation. Caseinogen, which is the most important of the milk proteins, the total of which amounts to about 3 per cent, is a protein of high biological value in a condition of almost perfect solution. The carbohydrate constituent (4 to 5 per cent) is lactose, which has the useful property of not being sweet so that it does not tire one by its insipidity, and of withstanding [illegible]ction of yeasts longer than most sugars. [illegible]at (3 to 4 per cent) in milk is in the form of an extremely fine emulsion which makes it particularly easy to digest.

Milk contains a sufficient quantity of the essential metals, the only exception being iron which is present in very small amounts. Finally, the vitamins A, B, C and D are all represented; vitamin D is present in 'summer' milk in large quantities but 'winter' milk is poor in this substance (in this country the vitamin-D content is nearly always high), and the vitamin-C content is also low and this vitamin is readily destroyed by boiling, but vitamins A and B are present in adequate quantities. That is to say, with the addition of iron, milk provides a diet of high nutritive quality with all the constituents that recent nutritional investigation has shown to be necessary for health, and, thus, science has confirmed a conclusion to which centuries of human experience had already led us.

Probably the most striking tribute that can be paid to milk as a food is its survival as a substance of primary importance in the human dietary during the pre-bacteriological days when it was rightly considered as a prime factor in the spread of epidemic diseases. Even to-day when we do know how to negative its potentialities as a disease carrier, it provides more problems to the sanitarian than any other article of food. It is an ideal medium for bacterial propagation, far better than water on account of its nutritive properties and far better than other equally nutritious foods on account of its fluid consistency. Nearly all the problems connected with milk arise from its distribution to the consumer after it leaves the udder of the cow, and laws connected with milk are framed to protect the consumer not only from being supplied with contaminated milk but also from being cheated by dilution of the milk by the addition of water.

The laws that have been introduced in many countries, England for example, have been very necessary and have achieved the object of ensuring that the consumer gets an uncontaminated milk of good quality, but there has been another side to the picture. Twenty-five years ago Sir Henry Newman, in a lecture to students at St. Bartholomew's Hospital, remarked that he viewed with concern the increasing load of laws and regulations applied to milk, because, he said, it was causing, and would cause (and, we can now say, has caused), a rise in the price of milk so that the poorer classes would be unable to afford to purchase it. The present-day public health tendency is, without in any way lessening the stringency of the regulations, to make them easier to work, and by means of marketing boards to keep the retail price of milk at a low level without making its production economically unsound to the dairy farmer; that is to say, the nutritional rather than the bacteriological aspects of milk are receiving the greater attention.

The problem in India is of course a different one. In England, even in the rural areas distribution is the main difficulty, whereas in India this is only of importance in a very small percentage of the population, as even in towns a cow is often kept in the well-to-do households. The problem in India is the supply itself, which at less than 3 ounces *per capita* is about a quarter of that of Great Britain and one-sixth that of the United States, not so much on account of the shortage of cattle but on account of their poor quality and, in many parts of India, of the shortage of suitable grazing.

His Excellency the Viceroy has given a much-needed stimulus to the milk-supply problem by importing bulls of good milk-producing strains and thereby trying to raise the quality of the cattle in India. If his example is followed, as we hope it will be, one aspect of the problem will in time be solved, but, as the Viceroy himself has pointed out, it is useless to improve the breed of cattle unless they can be provided

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with adequate food for their nourishment and this is a problem that is exercising the minds of agricultural experts in all parts of India today. There is apparently very little prospect of extending to any great extent the grazing acreage but there is much that can be done to improve the quality of the existing grazing and to supplement it by growing suitable fodder crops. Some research work on this subject has been done and, though more requires to be done, a much more urgent need is widespread propaganda to disseminate knowledge that has already been gained.

With that of grazing and fodder, inevitably arises the question of disposal of the enormous numbers of useless, or nearly useless, cattle that produce about a *pow* of milk a day and eat nearly as much of the available food as those that give ten times as much milk. This latter problem involves religious principles that are very difficult to overcome.

There is here an opportunity for the combined efforts of the departments of medical research, agriculture and animal husbandry to make a great drive during the next few years and to increase the milk supply in this country to a figure more in keeping with India's requirements, as, with a Viceroy who has such special experience and interest in all these subjects, they can count on his whole-hearted support.

Special Articles

MEDICAL INTERFERENCE

By M. O. SCHIMELGOR, M.D. (Moscow)
European and Indian Nursing Home, Sadir Road, Peshawar

THROUGHOUT medical history there has been a struggle between two opposite opinions about the relation between different organs, their reciprocal influence on one another, and their relation through the nervous and hormonal systems. The present level of medical science justifies the belief that the reciprocal influence of organs is effected through the endocrine vegetative system as a whole with the assistance of the psychic. The psychic functions in the process cannot be separated from the functions of the endocrine vegetative system. The method adopted in some countries of blocking the sympathetic nervous system by novocaine is probably based on the fact that novocaine interferes with the functions of the endocrine vegetative system, thereby affecting the cortex cerebralis and other organs. In this way the whole organism becomes affected, and particularly so that part of it in which the normal process is for some reason weakened, *i.e.*, its part affected by the disease.

The effect of novocaine is short lasting, but the favourable reaction often sets in only after a few days; therefore we see here not the effect but the after-effect of novocaine.

Every interference with a process of the organism or with the normal inter-relation between organs calls forth a protective reaction of the whole organism. There is no doubt that such reaction is organized by the psychic endocrine vegetative system. The enhanced protective activity of the organism may affect the disorganized functions of the organism (*i.e.*, the illness), and cause the illness to follow a more favourable course. It goes without saying that the intensity of the protective reaction (both generally in the whole organism and locally in the different organs) and its form depends on many conditions, such as the potency and the kind of the irritant, the place of its application, the nature and acquired qualities of the organism, the measure of stability or instability of the tissues, organs, and organism as a whole.

After the administration of a strong, but not excessive, irritant the protective reaction develops in such a way that the morphological and functional disorganization caused by the irritant disappears, and balance in the functions of the organism sets in again. In a case where previous to the administration of the irritant there existed somewhere in the organism a state of disturbance, the protective reaction, generated by the irritant, may beneficially affect the disturbed area. If, however, the irritant should be excessive, the protective process may prove inadequate, and, consequently, not only may the effects of the irritant survive, but other functions of the psychic vegetative endocrine system and of the organism may become disorganized, and the original disturbance may be accentuated. Such a conception of the reaction of the organism refers to any active therapeutic interference such as milk, serum, operation, etc.

The paradoxical results which sometimes appear after some therapeutic or surgical interferences find their explanation in the protective process described above and generated by them in the organism.

We know that in cases of angina pectoris the removal of the third sympathetic knot has beneficial results for the patient, though it has been proved by experience that this knot is the centre of the nerves dilating the arteria coronaris. What then is the reason for the effect of the operation? The whole of the psychic vegetative endocrine system reacts to the grave

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irritation caused by the operation; the disease in the muscles, nerves and arteries of the heart is subjected to the action of the protective process and an amelioration ensues, in spite of the fact that the centre for dilating the cardiac arteries has been removed; the remaining vegetative endocrine system, as a whole, counteracts the effect of the operation; and in the course of the general reaction of the organism the hormonal action of the various organs is stimulated (as we know, the adrenalin from supra-renal glands, and the hormone-like substances from the striped and cardiac muscle, dilate the cardiac arteries).

The following is a second illustration to our subject. It is known that the hormones of the parathyroid gland set free calcium in the blood, similarly to the adrenalin setting free sugar. Many believe that the disorganization of the functions of the parathyroid gland is responsible for arthritis deformans. Surgeons, therefore, have removed the parathyroid gland in cases of various bone diseases, and have often achieved thereby good results. A certain surgeon of Straasburg, while performing an operation for the removal of the parathyroid gland in a patient suffering from arthritis deformans, was unable to find the gland he sought and stitched up the wound without having removed the gland. The effect of the operation, however, appeared to be the same as if the gland had actually been removed. After that experience the surgeon used to incise the parathyroid gland and sew up the wound, and that operation proved to be just as effective. Here again the powerful irritation was responsible for calling forth a violent defensive reaction in the whole organism, and the general recuperating process affected in its action the existing disorganization in the feeding of bones and joints. Many more examples of similar reactions of the organism can be cited, but the above is sufficient to illustrate our point that improvement is often due to the defensive reaction of the organism and not to the operation, or, to be more accurate, improvement often takes place in spite of the operation (removal of the third sympathetic knot and the removal of the parathyroid gland).

We have seen that a considerable irritation of the vegetative endocrine system, caused either by a physical, mechanical or chemical agency in any part of the organism, produces a general reaction in the organism. It goes without saying that, in the presence of a disease in the organism, this reaction may lead either to an improvement in the course of the disease, or to a deterioration, or else have no marked effect on it at all, according to the conditions of the organism, to the nature of the disease and the kind of the irritation.

We are inclined to think that in the instances quoted above the effect, in addition to the surgical action, was due to a considerable degree to the psychological factor as well. Often the general protective reaction of the organism described above is generated by the injection of certain substances, milk, water, etc.

It has already been mentioned above that various effects which may follow the protective reaction of the organism are dependent on the state of the organism, its acquired and inherited peculiarities, the nature of the medical interference, etc. There is, however, a specific peculiarity attached to protective reactions, *viz*, the medicine does not act when it enters the organism and its cells, nor even when it is in the cells, but after leaving them. Actually, when a medicine, an alien matter in the organism, calls forth a protective reaction, that reaction reaches its full vigour of reconstruction after the medicine has left the cells of the body and the organism in general. As the reaction does not stop with the ejection of the medicine but continues for a considerable time, the organism, and particularly the diseased organ, has the chance of wholly concentrating on re-establishing the functions affected by the disease. When a medicine is repeated, every subsequent dose calls forth again a general reaction of the organism, directed primarily to the ejection of the irritant. It is clear that after a number of repetitions of a medicine, particularly in large doses, the protective powers of the organism may be considerably weakened, and consequently the protective reaction may prove inadequate; this should always be kept in mind when repeating medicines.

In that case we may notice something similar to an agent of infection which has entered the organism and is spreading. Repeated ingress into the organism of bacterial toxins from the seat of infection, particularly if they enter in large quantity, may, to a larger or smaller extent, interfere with the development of the protective reaction. Therefore it is only after the administration of the medicine has been discontinued that the best conditions set in for the full development of the protective reaction, as well as for the reaction of reconstruction by which the former is followed.

It should not however be forgotten that any therapeutic method of producing a violent reaction contains an inherent danger. As already mentioned above, not every violent reaction that may be called forth will necessarily develop as a protective reaction, and a deterioration may set in in the region of the disease, or even in another region, as a result of the direct pathological action of the medicine. These effects of medicines often remain undetected, and sometimes come to light only after a considerable time. In some cases they are very difficult to establish, and only a very careful scrutiny of the antecedents of the patient, enquiries from him about the state of each organ and its functional peculiarities, both in the past and present, will help to identify the negative effect

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of previous treatments on the health and energy of the patient. As an illustration of the negative after-effect of violent medical therapy, the following example may be cited: During a recent epidemic of jaundice in Germany, it was established that those cases in which there had been at some previous time salvarsan treatment had been particularly serious and had shown a great percentage of deaths.

Bearing in mind that the action of any medicine or medical interference actually amounts to the reaction they generate in the organism as a whole, that they may cause serious consequences in the organism, both immediately and in the more distant future, and that therefore we should be able to assess the conditions of the organism as a whole and observe its changes, it would appear that the theoretical and practical medical science has the following questions to solve :—

1. The minute study of the protective reactions of the organism as a whole, consequent on medical interference; the study of the immediate as well as more distant results of such reactions.

2. Practitioners should not be guided only by the action of medicine but also by the individuality of the patient, and should bear in mind the possible reaction of the organism, both immediate and distant.

3. The action of various medicines should be further investigated.

4. The effects of the various therapeutical interferences both on particular organs and on the organism as a whole, *i.e.*, on the co-ordinating system of the organism (vegetative endocrine system and cortex cerebri) should be reinvestigated.

THE TREATMENT OF PILES

By H. WILLIAMSON, O.B.E., M.D., F.R.C.S.E., M.R.C.P.
MAJOR, I.M.S.

St. George's Hospital, Bombay

THE ætiology of this 'universal and distressing complaint' which is very common in India is variable and need not be discussed in detail, though heredity, constipation, sedentary habits, child-bearing, middle age and drastic methods of cleaning the anus are all important factors, while in later life carcinoma of the rectum and enlarged prostate must never be forgotten.

On looking at a patient's anus the surgeon cannot help noticing the radially arranged rugæ in the skin: the rugæ, of course, allow the skin to stretch during defæcation. From this simple observation a very important moral can be drawn, namely that all incisions and scars in this region should run parallel with the rugæ, that is in the long axis of the bowel, otherwise stricture will result. Just as the string in a pair of pyjamas holds the trousers up, so will a ring of fibrous tissue round the anus hold the fæces in, and, for the same reason, it does not stretch.

Internal piles.—A few inches above the anus the superior hæmorrhoidal artery, which is the terminal branch of the inferior mesenteric, divides into two, each branch subdividing. The artery is accompanied by veins, varicosity of which is the cause of internal piles. One might therefore expect there to be an even number of piles, but this is not so, the usual arrangement being an ace-of-clubs formation, one in front and two behind, probably because of the situation of the three bands of longitudinal muscle fibre in the large bowel.

Palliative treatment.—In very mild cases, where the cause is unlikely to persist, plenty of exercise, plenty of fluids, avoidance of alcoholic or other excesses, and the prescription of a teaspoonful of confection of sulphur and senna each night or a tablespoonful of liquid paraffin twice a day will often effect a cure, especially if helped by a local application, of which there are many on the market.

Injection treatment.—This gives good results, and should always be tried when the piles are not inflamed, ulcerated, prolapsed or very large, and when the patient can be kept under observation, in case it needs to be repeated. Apart from these exceptions the only one I know is the hardy Pathan, who generally prefers something more drastic.

Many specula and syringes, usually called by the name of the inventor, have been devised, but the ordinary fenestrated Sim's speculum supplied by government does very well and a small 'Record' syringe with a fine needle is as good as any other. A sterile solution of 5 per cent quinine bihydrochloride with 10 per cent urethane in water gives very good results. It can be had in 2 c.cm. ampoules prepared by Messrs. Parke, Davis and Company, or can be made up in a teaspoon before use. Another good solution is one of 15 per cent carbolic acid in equal parts of glycerine and water.

Method.—With the patient on his left side and his right foot flat on the table so as to abduct the right knee, the well-vaselined speculum is introduced and slowly opened. The surgeon now waits a moment to allow the piles to swell, a process more easily seen with a flash-light. Three main piles are generally visible. The needle of the syringe is now pushed into one of the piles and not more than half a c.cm. of fluid injected, the process being repeated with the other two piles. If there are more than three, only three should be injected at one sitting, and if the operation has to be repeated, three weeks should be allowed to elapse, as this gives time for the injected piles to shrink. If, after injecting a pile, the surgeon decides that the case needs operation, the latter should be deferred; I once tried combining the two and the result was a stricture. External piles should never be injected.

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As the rectal mucosa is insensitive, injection is practically painless; in fact, if the patient complains of the puncture the surgeon can be pretty sure he is making it too low down. For a few days after the operation the patient has slight discomfort and a feeling of fullness in the rectum, but this soon passes off.

Clamp and cautery.—The operation about to be described was invented by Dr. Neve of Kashmir, and is done in Quetta and Shikarpur by Sir Henry Holland, to whom, amongst many other things, I am indebted for my knowledge of it. Properly done, it has many advantages. It is practically bloodless, an important factor with an anæmic patient; it is easy, so can be done in out-stations; it is quick, and, above all, it is not likely to be followed by hæmorrhage, recurrence or stricture.

Preparation.—The morning before the operation the patient is given an ounce of castor oil with 20 minims of tincture of opium and kept on a light diet; the evening before operation he is given a further 10 or 15 minims of tincture of opium with a drachm of tincture catechu, and next morning, about two hours before operation, a soap-and-water enema.

Anæsthetic.—Half a cubic centimetre of stovaine (Barker's solution of 10 per cent stovaine in 5 per cent glucose solution in distilled water) is injected through a lumbar puncture with the patient sitting up. This gives perfect anæsthesia and relaxation, but is apt to be followed by severe headache if much cerebro-spinal fluid is allowed to escape. Stovaine takes about ten minutes to become 'fixed', so the patient's head and neck should be kept above the pelvis for that time, after which it does not matter. If for any reason a spinal anæsthetic cannot be given, any general anæsthetic will do, but the patient must be watched when the anus is stretched, as he is apt to stop breathing if not properly under. Local anæsthesia is difficult for the inexperienced and is usually accompanied by poor relaxation of the sphincter.

Instruments.—A Neve's pile clamp and three iron cauteries (*see* figure 1), three or four pairs of Kocher's forceps, and a pair of scissors curved on the flat are all that is required. The clamp is like a pair of carpenter's pincers with curved blunt edges and a screw to screw it tight, and the cauteries are small pokers with a wooden handle, and a ball on the end which fits easily inside the blades of the clamp.

THE OPERATION

Step 1.—The operator gently but firmly stretches the sphincter with his gloved and vaselined forefingers or thumbs.

Step 2.—The piles are seen to swell and may partly prolapse.

Step 3 (*figure* 2).—Each pile is caught with a Kocher's forceps, the tip of which points to the centre of the anus.

Step 4.—Neve's clamp is applied, care being taken that its jaws point to the centre of the anus.

Step 5 (*figure* 3).—Each pile is snipped off with a pair of scissors curved on the flat, the Kocher's forceps remaining attached until the pile is removed.

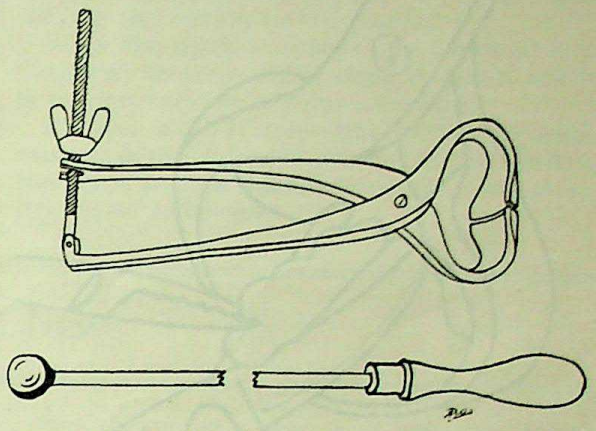


Fig. 1.—Neve's clamp and cautery.

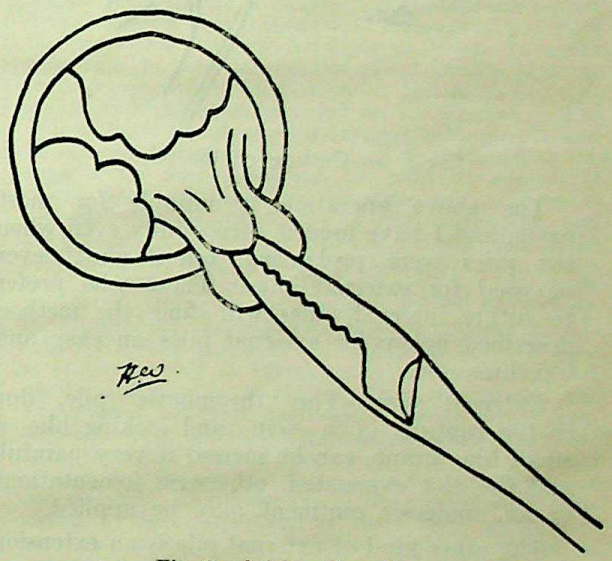


Fig. 2.—Seizing the pile.

Step 6 (*figure* 4).—The raw edge of the pile is well cauterized, the clamp being held away from the peri-anal skin so as not to burn it.

Step 7.—The clamp is unscrewed and gently opened, after which it is dipped in cold lotion to cool it before the next pile is treated.

Step 8.—The other piles are dealt with in the same way.

Step 9.—A suppository containing one grain morphia is gently inserted into the rectum, followed by a wick of vaselined gauze to prevent adhesion between the opposite sides. Large tubes or rolls of gauze should be avoided as they separate the cauterized edges and lead to bleeding.

After-treatment.—The patient is kept in bed for ten days, the bowels being opened on the fifth day: the best aperient is a dose of castor

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oil, followed in four hours by an enema of equal parts of hot soapy water and olive oil.

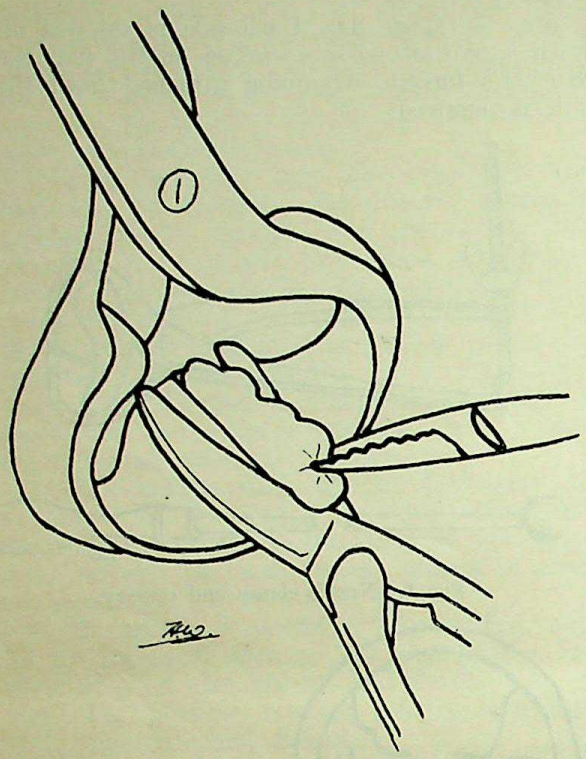


Fig. 3.—Cutting off the pile.

The above operation is suitable for most cases, and I have used it successfully even when the piles were prolapsing, but it must never be used for external piles. Those who prefer to suture internal piles will find the method described below for external piles an easy and bloodless one.

External piles.—The 'thrombotic' pile, due to the rupture of a vein, and looking like a small blue grape, can be incised if very painful, and the clot evacuated, otherwise fomentations or an analgesic ointment may be applied.

The other kind of external pile is an extension or relic of an internal one, and varies in constitution from a tag of skin to a vascular mass. The 'three needles' operation, so useful in anterior staphyloma of the eye, is a good way of dealing with the condition. Unless internal piles are being operated on at the same time, a local anæsthetic with some adrenalin is injected into the base of the pile, which is then picked up with a pair of forceps. Three (or more, or less) curved needles are now passed through the base of the pile, parallel with the anal ring (*see* figure 5). The pile, with the needles in position, is now snipped off with a pair of scissors, the needles are pulled right through and the ligatures tied, thus bringing the raw edges together and allowing no time for infection or hæmorrhage. The top stitch should be tied round the upper edge of the stump so as to catch any artery.

Prolapse of the rectum.—A word about the treatment of this condition may be helpful, as

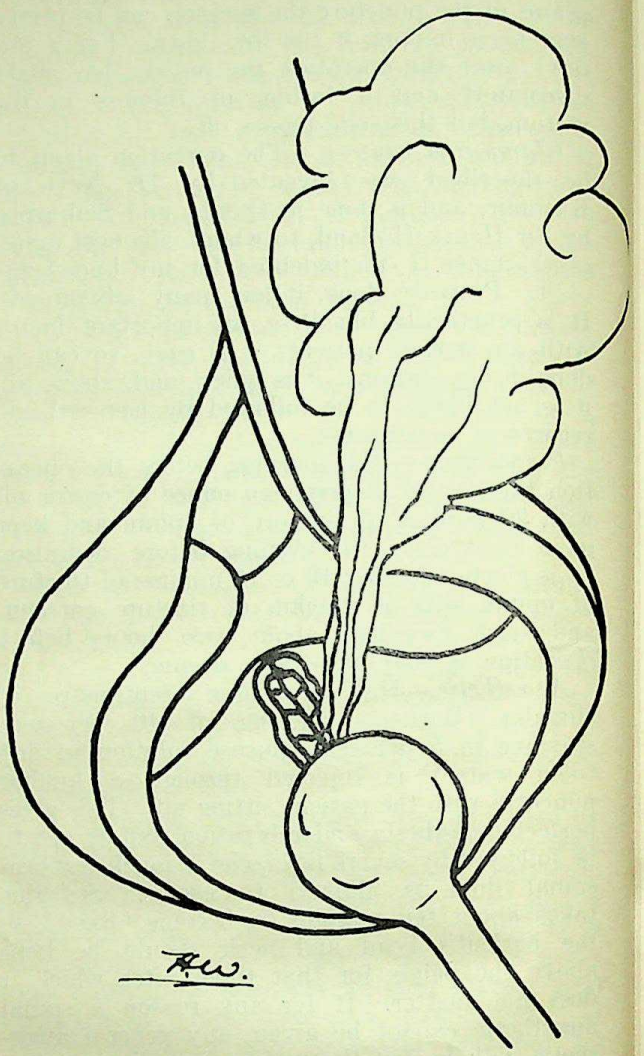


Fig. 4.—Cauterizing.

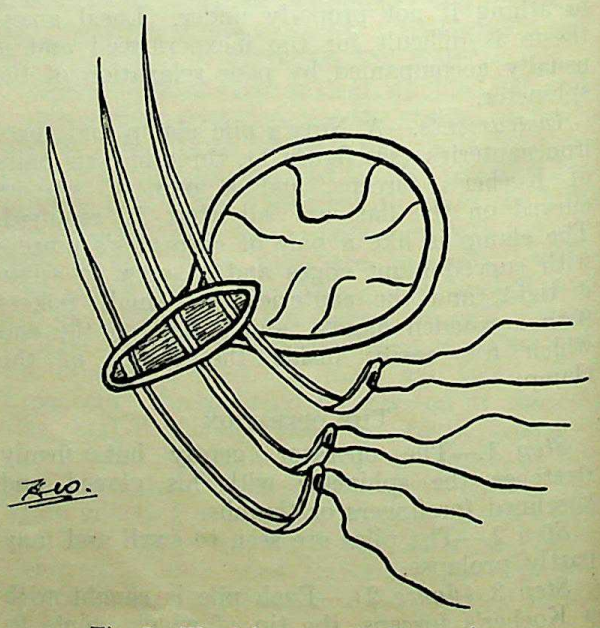


Fig. 5.—The 'three needles' operation.

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the procedures recommended in textbooks on operative surgery are rather formidable. When palliative measures fail the following method will often effect a cure. The surgeon's left forefinger is placed in the patient's rectum, and, guided by it, the needle of a syringe containing 1 c.cm. of rectified spirit is passed up under the mucous membrane from the muco-cutaneous junction for a distance of one to one-and-a-half inches, the prolapse, of course, having been reduced first. Four punctures are made, one in front, one behind, and one at each side, 1 c.cm. of spirit being injected at each, and care being taken not to injure the male bulb or urethra.

A piece of stout silkworm gut, with a large curved needle at each end, is now taken, and one of the needles passed up inside the rectum, somewhat to one side, for about two inches (less in a child). The needle is then thrust through the mucosa and brought out through the skin lateral to the coccyx. The other needle is similarly manœuvred on the opposite side and the ends of the silkworm gut emerging through the skin are tied over a piece of gauze, thus slinging the rectum to the coccyx.

When the stitch is removed on the tenth day there may be some sepsis along its track, which is no drawback as it helps adhesions.

Pruritus ani.—If treatment of the apparent cause fails to relieve the pruritus by far the best remedy is a single intensive dose of *x*-rays given by a good radiologist.

Medical News

PRESIDENTIAL ADDRESS DELIVERED BY MAJOR-GENERAL SIR CUTHBERT SPRAWSON AT THE SIXTH SESSION OF THE MEDICAL COUNCIL OF INDIA, ON 5TH NOVEMBER, 1936

GENTLEMEN,

Your president has not hitherto addressed you on council matters as a whole. In the earlier days of our constitution our progress was necessarily slow and perhaps laborious; but we have now reached a stage when with more rapid development in the present and the prospect of changes in the future it becomes advisable that the president should rehearse from time to time our activities and explain what your executive committee have done and are doing. Your executive committee will be well acquainted with the matters on which I shall comment, and a study of their proceedings, especially those of their meeting last August, will inform council members of their activities; but our council meet seldom, and it will, I believe, be advantageous if I review briefly for the benefit of members some matters of immediate interest.

Before I go further I must express a deep personal regret, which I know is shared by all of you, at the death of Sir Fazl-i-Husain. Sir Fazl had much to do with the formation of this council, for he was the member of the Viceroy's Council in charge of the Department of Education and Health at the time of the passing of the Medical Council Act, and many of you here will recollect his address at the opening of the first meeting of this council in March 1934. His death has cut short a career that was about to offer still further opportunities to his administrative ability.

You will be aware that since the last meeting of our council the General Medical Council of the United Kingdom have recognized for registration the medical degrees of the universities of Bombay, Lucknow, Madras and Patna and that in the case of the first three universities this recognition has retrospective effect since February 1930, so that there is now no break in the continuity of the recognition they formerly received. The date from which the degrees of Patna University may be recognized is now the subject of separate consideration by your executive committee. You will have noted that the General Medical Council have accepted for recognition all those degrees that we have ourselves hitherto approved. It will be for you to consider the sufficiency of the degrees of some of the other universities of British India during the present session.

Since the purpose of this council under the Medical Act of 1933 is to establish a minimum standard of higher qualifications in medicine, it follows that we are deeply interested in the medical curriculum and it is for that reason that our Act gives us powers to require from time to time information about courses of study from every medical institution in British India that grants a qualification included in our schedules. The council have already published their recommendations on courses of study; but you will be aware that the work of the medical student has been the subject of recent discussion in several countries and that it is necessary for us to reconsider the curriculum and consequently our recommendations thereon from time to time and to adopt our advice to improved knowledge and experience. It is not the object of our council to implant a rigidity in the courses nor even to suggest an entire uniformity in the methods of different universities; but with a rise in standards and improvements in knowledge and in opportunities it follows that our recommendations on courses of study require revision. The council last year instructed your executive committee to carry out such a revision and your committee have now done so and have sent their revised draft recommendations to the universities for their opinions and remarks. The inspectors of the council after completion of their inspections at the several universities have submitted a general report on both courses of instruction and examination of the universities as a whole, and a copy of this report, with the remarks of the executive committee thereon, has been supplied to each member of the council. These reports have also been sent to the universities, with the revised recommendations on courses, and when their observations are received your committee will place the matter before you.

Apart from the details of instruction that your inspectors have to investigate it is necessary for them also to see that the number of students attending classes is not too great for the capacity of the teachers or rooms or material provided for their instruction. Overcrowding may be estimated in various ways and no definite standards exist beyond which it may be said that the number of students should not rise. Your executive committee have however adopted one such criterion and have recommended that during his period of medical and surgical inpatient work each student should be continuously in charge of not less than five beds. An enquiry on this point from the universities has shown that already the majority of universities are able to comply with this condition: those who fall short of it have been requested to attain this standard.

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Another detail of instruction which has exercised your committee is the fact that many, if not most, of our universities do not take sufficient advantage of the great teaching advantages afforded them by a large hospital outpatient attendance. The teaching is sometimes too confined to the wards.

Your executive committee have also been considering the fact that the universities of Bombay and of the Punjab do not prescribe an age-limit for admission to the medical college nor a limit before which a student cannot obtain qualification. A case was brought to my notice where a young man actually obtained degrees of M.B.B.S. and registered them with the Provincial Medical Council before he had reached the age of 21 years. The necessity of preventing such a possibility in future will be brought to the notice of those concerned.

A further question which your committee have under consideration is the conditions in which at certain universities holders of an L.M.P. diploma are admitted to further courses and allowed to sit for examination for an M.B.B.S. degree.

A consideration of the work of the council in the first two and a half years of its existence and of the effects that this work has produced already by improvements in the courses and in details of instruction and examination in several universities and further by leading the medical faculties of these universities to consider several points in our recommendations should bring satisfaction to members of this council. The recognition that has been accorded to medical degrees by the General Medical Council is also a result of the work of this council and our inspectors. Such changes we may regard as direct good resulting from the establishment of this council: but I am still more impressed when I contemplate the amount of indirect benefit that may truly be said to have resulted from the reports of our inspectors and has in several instances brought authorities, both government and private bodies, who are responsible for the maintenance of medical colleges and their attached hospitals, to make improvements costing in some cases large sums of money in order to comply with the recommendations of our inspectors. I need only instance the changes that have occurred or are occurring in colleges and hospitals in Bombay, in Rangoon and in Calcutta in order to illustrate my meaning and, in particular, the increase in the staff and the expenditure of 16 lakhs of rupees on hospital buildings in Vizagapatam. I consider that the council have reason to be well satisfied with their inspectors who have made these reports and have conscientiously performed what must sometimes be a difficult task. Further I consider we may be satisfied with the response that universities on the whole have made to our recommendations and to the criticisms of our inspectors. Criticisms are not always welcome affairs, but, speaking generally, the remarks of our inspectors have been well received and suitable responses made by the universities.

In accordance with section 13 of the Medical Act it is our duty now to enter into negotiations with other countries, especially with those whose degrees are already in our second schedule, so that we shall be able by September 1937 to recommend to the Governor-General in Council what qualifications should in future be included in our second schedule. These negotiations have been commenced by our secretary and your executive committee is informed of them. To some countries, principally those in which Indian Nationals reside in appreciable numbers, but which do not possess medical qualifications of their own, we are making proposals for their recognition of those degrees that are in our first schedule.

You will find a list of these countries in the minutes of the meeting of the executive committee held in last August of which you already have copies. With most of these countries correspondence is still in progress and you will be asked at a subsequent meeting to consider the recommendations of your executive committee thereon. The usual tone of response from other parts of the British Empire is that these countries are prepared to recognize those of our degrees that receive also the recognition of the General Medical Council, but not to accept other degrees simply because they are in our first schedule. This response is not unnatural and need not cause us any dissatisfaction or diminish regard for our own council. The Medical Council of India is yet young and has to make its reputation abroad as it has already done in this country. We have found also that the General Medical Council is ready to help us and to understand our difficulties and our relationships with that older body continue to be happy.

In accordance with the principles of reciprocity the General Medical Council have sent for our consideration the latest series of reports by their inspectors on the final examinations of the licensing bodies in the United Kingdom. Your executive committee have considered these reports and have drawn the attention of the General Medical Council to various instances where their recommendations do not appear to be observed by licensing bodies, particularly the cases of the Apothecaries Society of London and the Apothecaries Hall of Dublin.

Quite apart from reciprocity the question of the registration or recognition of foreign degrees in India is under consideration by your committee; the point was raised by the Bombay Medical Council in connection with the application for registration by an Indian National possessing an American degree. The Provincial Medical Councils have been circularized as to their opinion on and their present practice in this matter, and when their replies are received the question will come before you with the recommendation of your committee.

These foreign relationships have further implications than may be at first apparent. We are most nearly concerned with French and Portuguese India, because they are parts of this peninsula, and we find there that whatever qualifications a man may possess he cannot practise medicine in those areas unless he be a national of the country concerned, whereas their nationals may practise without restriction in British India. Other countries have adopted a similar protection based not on qualification, but on nationality, and since this is not a question of medical standard this council, however interested, cannot pursue it. I am therefore approaching the Government of India to deal with this difficulty.

Since the last meeting of this council two new provinces of India have come into being. Each will be entitled to representation on the council by a nominated member, and Orissa, which has established a medical register, by an elected representative of the registered graduates. So far members have been nominated by the governments of the two provinces—Lieut.-Col. G. Verghese representing the Government of Orissa, and Lieut.-Col. B. F. Eminson that of Sind, and we welcome them both to our meeting to-day.

Something in what I have already said foreshadows the changes that will occur in this council after its first four years. Other changes will be that the council will be called upon to appoint a secretary from November 1937 and to elect a president in March 1938.

I conclude by remarking on the unremitting interest that all members of your executive committee have shown in the matters that come before them and on their unselfish zeal in travelling far to give to your council's questions the great advantage of their expert advice on all that pertains to medical education.

XV CONCILIUM OPHTHALMOLOGICUM

ACCORDING to the decision of the XIV International Congress held in Madrid in April 1933, the next Congress will be held in Cairo, Egypt.

In conformity with the decision of the International Council of Ophthalmology, London, of April 1935, the

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meetings will be held from 8th to 14th December, 1937. The two official subjects of the Congress will be:—

1. Arterial Hypertension of the Retina:
   General Introducers .. H. Wagner and Keith.
   Reporters .. Bailliart—Clinical and physiological aspects.
   Koyanagi—Pathological anatomical aspects.
2. Endocrinology and the Eye:
   General Introducer .. Snapper.
   Reporters .. Von Szily, Von Imre, Jeandelize, Lacarrere and Lo Cascio.

The papers should refer preferably to subjects related to the official themes. Only a certain number of papers may deal with independent subjects, provided that the International Council will pass them previously by reason of their originality and interest. The International Council has taken this decision in order to avoid the considerable accumulation of papers which in past Congresses has made efficacious debating extremely difficult. It has been thought preferable that the number of these should be reduced so that they can be discussed with the necessary fullness.

The Local Organizing Committee request the colleagues kindly to send three typewritten copies of the paper intended for reading together with a résumé of not more than 500 words to Dr. Marx, Secretary of the International Council, not later than 1st April, 1937.

Number and size of lantern slides, if any, should be stated, and whether epidiascopes or microscopes (and, if so, how many) are required for the lecture.

On the occasion of the fifth International Ophthalmological Congress a third edition of the Directory will appear. This Directory will contain data concerning the following subjects:—

1. Names (alphabetically arranged) and addresses of all oculists in the world.
2. Titles and volumes of all periodicals which deal with any branch of ophthalmology.
3. Statements of all ophthalmological associations.
4. Hospitals for eye patients.
5. Establishments or institutions for the blind, sight-saving classes, etc.
6. Statistics regarding blindness.

The Secretary of the International Ophthalmological Council (Dr. E. Marx, Oostzeedijk 316, Rotterdam, Holland) would be glad to learn from you whether there are still other subjects of general interest for oculists which, in your opinion, might be included in the Directory.

Two exhibitions, one scientific and one commercial, will be arranged.

Inscription for membership to the Congress is open for every medical man, and those who desire, will please send their applications to the Secretary-General as early as possible together with the sum of 50 Swiss francs, to cover the fees for subscription. The fees for ladies and other associate members of the congressists' families are 25 Swiss francs per person—those can attend receptions, excursions, etc., but are not entitled to attend the scientific meetings, nor will they receive a report of the proceedings of the meetings.

Further details of the Congress meetings, banquets, trips, etc., will be sent in due time, as well as the abstracts of papers and the identification cards for the reduction of railway and other fares.

A housing committee will take charge of facilitating the accommodation and lodgings of the members and their families during their stay in Egypt.

The work of the Organizing Committee will be greatly facilitated if the members subscribe as early as possible.

Papers intended for reading in the Scientific Meetings should be sent directly to Dr. Marx, Oostzeedijk 316, Rotterdam.

All other correspondence should be forwarded to the Secretary-General, XV Concilium Ophthalmologicum, P. O. Box No. 2001, Cairo, Egypt.

DR. M. TEWFIK,
Secretary-General.

CAIRO, *April* 1936.

INDIAN MEDICAL COUNCIL

LIEUT.-COL. B. F. EMINSON, M.B.B.S. (Lond.), D.O.M.S. (Eng.), L.M.S., Civil Surgeon, and Superintendent, Mental Hospital and Medical School, Hyderabad (Sind), has been duly nominated by the Government of Sind, under clause (a) of sub-section (1) of Section 3 of the Indian Medical Council Act, 1933 (XXVII of 1933), as a member of the Medical Council of India.

Current Topics

'Albuminuria' or Proteinuria

By G. A. HARRISON, M.D.

(From the *Medical Press and Circular*, Vol. CXCIII, 2nd and 9th September, 1936, pp. 189 and 205)

WHEN the statement is made that there is 'albuminuria', the speaker almost always means that one or more of certain qualitative tests on the urine are positive. Actually these are tests not exclusively for albumin, but for urinary proteins as a group. It follows that 'proteinuria' is a better term, and it has the advantage that the user is reminded that further examinations may be required. Accordingly it is logical, first, to describe the routine tests, and then to consider the precautions necessary in their execution. For reasons which will be discussed, it should be an invariable rule to examine microscopically the urinary deposit whenever protein is found. In practice, after these preliminaries, the clinical findings will dictate the next step, if any, to be taken. At this point the combined evidence will often enable a judgment to be made as to the probable source and nature of the protein or proteins in the urine, but in certain cases further tests will be necessary for their separation and identification, or, it may be, their estimation. In special cases the medical officer will wish to extend his examination by methods for assessing renal efficiency.

Whilst clearly it is necessary to consider the course, nature, separation, identification and estimation of the proteins, this article is concerned primarily with the practical clinical aspects, so that only the simpler techniques will be detailed, though a few references will be given to more elaborate tests, which would be undertaken in a well-equipped laboratory.

It is generally accepted that a simple chemical examination of the urine, including testing for protein, constitutes an essential part of the routine clinical examination of every patient, whether urinary symptoms are present or not. It is the rule before every operation, and for very many applications for life insurance. Clearly, therefore, proteinuria is a subject of wide and genuine importance.

ROUTINE QUALITATIVE TESTS FOR PROTEIN

A large number of methods are available for precipitating proteins, as may be appreciated by consulting the textbooks of physiological chemistry, and

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it is out of the question in this article to attempt to consider most of them. The writer's selection is based on his experience of those most commonly employed in clinical work, and is limited to three. The boiling and acetic acid test is probably used more than any other; the salicyl-sulphonic acid test has the advantage that no heat is required which is true also for the nitric acid ring test; but the last, though frequently employed, may lead to a number of errors as detailed below.

The boiling and acetic acid test.—Urine is poured into a test-tube up to the two-third or three-quarter line. The tube is inclined, and the top half-inch column is boiled by means of a small flame. A precipitate indicates protein or earthy phosphates. A single drop of acetic acid (about 33 per cent) is added and the boiling is repeated, when phosphates re-dissolve, but protein remains undissolved.

Albumin, pseudo-globulin, and eu- or lipoid-globulin are coagulated by heat, and mucus may be thrown out on acidification. Bence-Jones' protein may be precipitated with moderate heat, to re-dissolve on boiling, but resolution may be incomplete or not noted, and the protein may be missed altogether if there has been over-acidification (*see* later).

The initial reaction of the urine is very important and it is a golden rule always to take it with litmus before testing for protein. On heating, carbon dioxide is driven off, and in some cases the resulting shift of reaction towards the alkaline side may bring about a precipitation of earthy phosphates, which are re-dissolved on acidification by acetic acid. The optimum reaction for the precipitation of proteins is slightly acid. If the urine initially is very alkaline—and samples provided for testing fairly commonly are ammoniacal owing to decomposition by bacteria—the boiling may not bring down the protein owing to the formation of alkaline metaprotein. If, however, the boiled mixture is now made just acid to litmus with 33 per cent acetic acid—as much as 5 to 10 drops may be required in some cases—the protein is precipitated, and this may cause surprise. (Metaprotein is insoluble in *neutral or slightly acid* solutions of salts.) This effect of alkaline urine is a practical point, for it may lead to failure to detect proteinuria or to the false conclusion that the 'albuminuria' has cleared up.

Naturally-acid urine is never so acid as to cause failure to detect protein by conversion into acid metaprotein, but it is essential to avoid making the boiled urine grossly acid with acetic acid lest this should happen.

The salicyl-sulphonic acid test is performed by adding to 10 to 12 drops (about 0.5 c.c.) of 25 per cent w/v salicyl-sulphonic (sulpho-salicylic) acid to about 5 c.c. (1-in. column in an ordinary test tube of $\frac{5}{8}$-in. bore) of urine. Proteins (albumin, globulins, mucus, Bence-Jones' protein, proteoses) give a white precipitate. Whenever there is any doubt as to the existence of a precipitate the treated urine should be compared with untreated urine in another tube held by the side of the first. Another practical aid is to view the two tubes in front of a shaded electric light (*e.g.*, microscope lamp).

Very uncommonly uric acid is precipitated, but is promptly differentiated by warming, when it re-dissolves. Again, the initial urinary reaction is to be remembered, for 0.5 c.c. of the salicyl-sulphonic acid may not be enough for 5 c.c. of urine if the initial reaction be very alkaline. Uroselectan (sodium salt of 5-iodo-2-pyridone-N acetic acid), used for making the urinary tract opaque to *x*-rays, gives a false positive reaction if administered within the previous six hours. The urine gives a white crystalline precipitate, which may be copious. Differentiation is easy because the precipitate (presumably of the free organic acid) is readily dissolved by adding about two volumes of absolute alcohol and warming.

Heller's nitric acid ring test is performed by superimposing about 3 c.c. ($\frac{1}{2}$-in. column) of urine on a similar volume of concentrated nitric acid. A white ring generally indicates protein (albumin, globulins, mucus, Bence-Jones' protein or proteoses), but occasionally may be due to urea nitrate, uric acid, uroselectan, resinous bodies or even bile acids. Urinary pigments or chromogens are oxidized by nitric acid to darker compounds, and when proteinuria is slight the white ring may be obscured by the pigmentation. The protein is changed by the nitric acid into metaprotein, which is insoluble in strong mineral acid.

PRECAUTIONS IN EXECUTION OF ABOVE TESTS—CONTAMINATION OF URINE

Proteinuria may result from contamination of the urine in several ways, particularly in women. Gross admixture with menstrual discharge will be suspected from the red colour of the sample, but lesser grades of contamination in the same way, as also access of a vaginal discharge other than that due to the menses, are frequent causes of slight proteinuria in women. They should be considered whenever proteinuria is accompanied by a quantity of squamous epithelial cells in the centrifuged deposit. Careful local cleansing just before micturition usually avoids this difficulty, when the sample is to be examined by chemical means only, but catheterization is generally performed if the bacteriology is also to be studied.

Fæcal contamination of slight degree seldom interferes in testing for protein; the fæces contain varying amounts of mucus, but only gross contamination is likely to cause trouble.

In males contamination with semen is at times responsible for positive tests for protein; the presence of spermatozoa in the centrifuged deposit gives the clue, and in all such cases another sample of urine should be obtained for test purposes.

The urine may be opalescent or turbid from a variety of causes thus making it difficult to decide whether protein is present, if the urine is not first cleared. In practice all such turbid urines should be filtered, and this will remove turbidities due to suspended phosphates, urates, or to gross pyuria, etc., but it will not invariably clear the urine entirely; in that case the residual opalescence is most commonly due to bacteria, and is seldom so marked as to interfere with subsequent testing by the boiling and acetic acid test, or by the salicyl-sulphonic acid test, provided that a comparison tube be employed as recommended. More elaborate means of clarifying the urine are seldom justified in practice owing to their being so time-consuming.

Occasionally deliberate contamination of the urine, *e.g.*, by milk, may be responsible for positive findings, in which case catheterization will be required. At other times, *e.g.*, in life-insurance work, it may be important that the sample be passed in the doctor's presence.

In conclusion, the macroscopical and microscopical examination of any sediment or suspended matter will usually guard against errors due to contamination.

MICROSCOPICAL EXAMINATION OF URINARY DEPOSIT ESSENTIAL WHENEVER PROTEINURIA IS FOUND

Positive tests for protein should invariably be followed by an examination under the microscope of the urinary deposit, separated by centrifuging, unless the deposit is macroscopic. The first reason for this rule has already been considered above under the heading of contamination, and is obviously of great importance.

The second reason is that it often aids in the interpretation of the positive results, always, of course, in the light of the clinical findings, and may thus assist in deciding from what part of the urinary tract the protein is coming. Thus presence or absence of casts, erythrocytes, leucocytes and various types of epithelial cells, and the approximate quantities present, all are important in assessing the significance of the proteinuria. Mucus can often be recognized under the microscope. It is therefore essential to consider the morphology of urinary deposits in any practical article on proteinuria.

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THE FINDINGS ON EXAMINING URINARY DEPOSITS

If a deposit is visible to the unaided eye at the bottom of the urinary receiver, a few drops are sucked up into a teat-pipette, and one or two are mounted under a cover slip on a slide, and examined directly under the microscope.

In all other cases about 10 c.c. of the well-mixed urine are centrifuged and the supernatant fluid is carefully decanted completely. On righting the tube one or two drops will drain back on to the deposit, with which they are thoroughly mixed by sucking up into the pipette, and then squirting them out repeatedly in order to detach the deposit and obtain an even suspension, which is then mounted and examined.

It is impossible in the space available to give a detailed description of the great variety of urinary deposits, which are described in the books on clinical pathology, physiological chemistry, etc., but an attempt will be made to outline the general principles, together with some practical items from the point of view of proteinuria. It takes years of experience to reach the stage when every constituent of every deposit can be labelled with reasonable certainty, but a much shorter period is sufficient to learn what to look for, and what is important practically.

Deposits may be conveniently classified under four headings: cells, casts, crystals plus amorphous chemical deposits, and miscellaneous.

Normal uncontaminated urine, examined as above described, contains no red cells, and shows no more than about 20 leucocytes or 20 epithelial cells on the whole slide. One or two hyaline casts may be found, or perhaps an occasional cylindroid (*see* below) but any other type of cast should, in the writer's opinion, be regarded as pathological unless repeated examination (clinical and laboratory) permits the opposite conclusion (*see* later, and particularly under 'intermittent proteinuria'). Crystals and chemical deposits most commonly separate from the urine after it has been passed. The only chemical deposits of importance with reference to proteinuria are those in suspension at the moment of micturition, which for this reason should be witnessed by the doctor if possible. In the majority of these cases, too, the chemical suspension does not matter, and is observed fairly often in health, but it is among cases of this kind only that the medical officer may be justified at times in ascribing proteinuria to irritation by crystals.

Red blood corpuscles are very pale-yellow, homogeneous, biconcave discs of about 7 μ in diameter. They generally lie flat and show a double contour, best seen by carefully focussing up and down. In urine, however, they may be considerably altered in appearance, either becoming swollen eventually to spheres (hypotonic urine), and so losing their double contour, or becoming shrunken or crenated. They are not as refractile as other cells.

White blood corpuscles are a little larger than the average red cell, about 7 to 10 μ in diameter. They are colourless spheres, heterogeneous and granular, and the nucleus may be visible. In urine they may show varying stages of degeneration, and when both degenerated and numerous are often called pus cells.

Epithelial cells vary considerably in size and shape, depending on their site of origin from any part of the urinary tract from the kidneys down to the urinary meatus, or externally. It is important to be able to recognize squamous epithelial cells (*see* contamination above), but otherwise guesses only can be hazarded as to their origin, because no one type of cell is absolutely characteristic of one particular site. It is true that renal epithelial cells are about the size of leucocytes, roughly polygonal in outline with a well-marked nucleus, but such cells are not invariably derived from the kidney. Cells from the bladder and urethra vary much in appearance and size, depending on whether they are derived from superficial or deeper layers; 'tailed cells' often come from the bladder, but may also originate in the renal pelvis. As a class epithelial cells vary in size (the smallest being of about the diameter of a leucocyte, the largest being the squamous epithelial cell), vary in shape, are colourless, heterogeneous, often granular and nucleated.

Casts are derived from the renal tubules. Each may be regarded as an internal mould of part of a tubule, and formed by an exudate consisting mainly of protein. When detached and passed down the tract this constitutes the 'hyaline cast' in the urinary deposit. When the inflammatory reaction is more severe the epithelial cells of the tubule are also damaged and detached, and in varying numbers coat, or become embedded into, the surface of the hyaline matrix, so giving 'epithelial casts'. Similarly 'blood casts' are due to the hyaline matrix being coated with varying numbers of red cells. The cells, or possibly the matrix too, often undergo degeneration, giving rise to granules or fatty droplets, and so is formed the 'granular' or 'fatty' cast. As would be expected, all possible intermediate stages between these types are observed, *e.g.*, hyaline, with a few granules, or 'hyalo-granular', granular with an odd epithelial cell recognizable, or 'granulo-epithelial', and so on. Waxy casts are hyaline in appearance, but generally broader, and are fissured; they should not be regarded as necessarily indicative of waxy or amyloid disease of the kidney. Cylindroids look like long narrow hyaline casts, often indeed very long, and are by most authorities regarded as immaterial.

The finding of casts in proteinuria is important in that it points to some at least of the protein as being due to renal damage though the magnitude of the damage must never be hazarded from the urinary findings alone but always after consideration of the clinical findings (*see* later).

In the miscellaneous group are mucus, spermatozoa (*see* contamination above), bacteria or yeasts, parasites and foreign bodies. Mucus is present in normal urine in small amounts (*see* next section), but when in pathological amount it may be responsible, in part or even wholly, for positive reactions with the qualitative tests for protein and in acid urine may be centrifuged down and recognized under the microscope. Its microscopic appearance is difficult to describe but once appreciated recognition is easy; it is in ill-defined smeary streaks or strings.

True bacteria—bacteria in the urine *in vivo*—may or may not be accompanied by proteinuria, depending on the presence or absence of a sufficient grade of inflammation at some point in the urinary tract. In this country parasites (bilharzia, filaria, echinococcus) are a very uncommon cause of albuminuria.

So far no mention has been made of the interesting work of Addis in counting the number of cells and casts in the twelve hours' night urine, because it is too elaborate and time-consuming for routine work. It is mentioned, however, because he does find a certain number of red cells, leucocytes, and even casts in normal urine, and sets a limit for each, above which the finding may be regarded as pathological. Though more accurate and quantitative, Addis's results are not considered to be contradictory to the interpretation given above of the practical rough working method recommended.

THE SOURCES AND NATURE OF URINARY PROTEINS

Normal urine contains no protein other than a minute trace of mucus, which is present in so small a quantity that it does not give a positive reaction with any of the routine qualitative tests. None the less it may become apparent to the unaided eye when a relatively large volume (*e.g.*, 200 c.c.) of urine is allowed to stand undisturbed by its separation as a light flocculent cloud.

Pathologically, proteins pass into the urine either by exudation (plasma-albumin, plasma-globulin and hæmoglobulin inside red cells) or by transudation (plasma-albumin and globulins), or through hæmorrhage greater or less, into some part of the urinary tract (plasma-albumin and globulins, hæmoglobulin inside red cells, and in relatively gross hæmorrhages, fibrinogen which yields fibrin). Further, the kidneys will allow to pass

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any proteins which normally are absent from or foreign to the plasma, or, as suggested by Bayliss, Kerridge and Russell, which have a lower molecular weight (*see* below), and therefore presumably (but not necessarily) smaller-sized molecules than the normal blood proteins [hæmoglobin which is free in physical solution in the plasma (hæmoglobinæmia), methæmoglobin (and presumably sulphæmoglobin) when extra-corpuscular, Bence-Jones' protein, and proteoses]. Likewise the kidneys filter off any protein truly foreign to the circulation but artificially introduced by injection, provided, according to Bayliss *et al.*, its molecular weight is below about 68,000.

Proteins which are excreted	Mol. wt.	Protein not excreted	Mol. wt.
Gelatin ..	35,000	Hæmoglobin ..	68,000
Egg albumin ..	34,500	Serum albumin	67,500 *
Bence-Jones' ..	35,500	Serum globulin	103,800
† Hæmoglobin ..	68,000	Casein ..	188,000

Mucus, which may be derived from the mucous membrane of any part of the urinary tract, including the prostate, pathologically may pass into the urine in amounts in excess of the normal trace.

Lastly, and very uncommonly, lymph may be added to the urine owing to rupture of an obstructed lymphatic into some part of the urinary tract (chyluria). This must necessarily cause proteinuria owing to the addition of lymph proteins (albumin, globulins, fibrin from fibrinogen, and a few red cells).

Tests for individual proteins

Here only the simple tests and practical points of clinical importance will be considered; the reader is referred to the laboratory textbooks for a fuller account of special tests.

Albumin is the most important of the urinary proteins clinically, and commonly is the main protein excreted. To that extent the term 'albuminuria' is justified, but it may be misleading, as already explained, when used as a synonym for a positive qualitative test for protein. Albumin is soluble in distilled water, and is precipitated from urine by full but not by half saturation with ammonium sulphate.

The *globulins* may be divided into at least two groups: pseudo-globulin, which is, and lipoid- or eu-globulin which is not, soluble in distilled water. Both are precipitated from urine by half saturation with ammonium sulphate, or by full saturation with magnesium sulphate, or by addition of anhydrous sodium sulphate to 22 per cent (Howe). The insolubility of lipoid- or eu-globulin in distilled water or highly diluted urine is of clinical importance (*see* Roberts' test below, under 'Mucus').

The *albumin-globulin* ratio has been claimed from time to time to be of clinical importance in differentiating the various types of nephritis. Hiller, McIntosh and Van Slyke showed that when all the urine was collected completely for several days and the average daily ratio of albumin to globulin was determined, the different groups of nephritis did show different ratios. Thus in nephrosis, where there is a big proportionate loss of albumin in the urine, the albumin-globulin ratio was high, generally above 10. In amyloid disease, where there is high output of globulin, the albumin-globulin ratio was low (0.5 to 5.0). In acute nephritis, albumin-globulin was between 5 and 10, and in chronic nephritis mainly below 5. The practical point emerged, however, that the ratios often showed large variations from day to day, and that a single determination on one day (and still more on one isolated specimen of urine) was quite untrustworthy in differentiation, and might be misleading. It may be concluded, therefore, that the albumin-globulin ratio is not a simple test of practical value.

Hæmoglobin in the great majority of instances is within the red cells, and not free in physical solution in the urine; hæmaturia is much more common than hæmoglobinuria. Much the best and simplest test for hæmaturia is the microscopical examination of the centrifuged deposit for red cells. The best test for hæmoglobinuria is the spectroscopical examination of the urine cleared by centrifuging (red cells pass through most filter papers to some extent) for the two bands in the green of oxyhæmoglobin; a negative finding should be returned only when a layer three or four inches thick has been viewed, as by placing the direct-vision spectroscope above a test-tube full of urine and looking through the long column, an electric bulb being the light source below.

When hæmaturia exists there must also be proteinuria, for even if the red cells be removed by centrifuging, the supernatant fluid is bound to contain albumin and globulin that has gained access to the urine simultaneously during the hæmorrhage.

In hæmoglobinuria the urine is red, or of a smoky tint, or normal in colour, depending upon the extant. Hæmoglobin is itself a protein, so that in hæmoglobinuria the qualitative tests for protein must be positive. Methæmoglobin, also being a protein, gives positive results with the routine qualitative tests.

Fibrinuria is readily recognized from the presence of clots, which, of course, vary in size, depending on the degree of hæmorrhage, so that slight fibrinuria is easily overlooked. The clots are red owing to the entanglement of red cells, except in chyluria, where the cells are usually so few that the clots appear white. The fibrin is easily removed by centrifuging or filtering.

Mucus, in pathological quantity, is much more commonly present in urine than is generally recognized. It behaves in its precipitating reactions very much as the globulins, and has generally been included in the globulin fraction in the differential estimation of proteins. It is precipitated by acetic acid in the cold, as also is lipoid- or eu-globulin; but mucus is insoluble in excess, whereas eu-globulin is soluble in even the slightest excess of the acid. It is widely believed in clinical medicine that these two proteins are of little or no importance in the sense that one or both are often found in intermittent proteinuria (*see* later), and that mucus is often due to cystitis or prostatitis, which are evident from the clinical symptoms and examination. In other words, if the proteinuria is due to a protein precipitated by cold acetic acid, there is no need to worry about kidney damage, so the following test has its clinical application.

Test for proteins precipitated by cold acetic acid.—About 5 c.c. (1-in. column) of urine in a test-tube are mixed with an equal volume of distilled water, and 33 per cent acetic acid is carefully added drop by drop till the maximum opalescence has been obtained. A pause of about a minute should be made after the addition of each drop, because precipitation is slow. Half the contents are then transferred to a second tube, to which a few more drops of the acid are added. In the first tube a precipitate, which is often slight, may be due to mucus or lipoid-globulin, or both. In the second tube a precipitate must be due to mucus only, for lipoid-globulin re-dissolves in excess acid. If, therefore, the opacity of the two tubes is the same, mucus alone is present; if the opacity of the first is greater than that of the second, both proteins are present; if the first tube is opaque, but the second is clear, lipoid-globulin alone is present.

In the writer's experience mucus alone is the commonest finding.

A second test, which is for lipoid-globulin, known as Roberts' test, is performed as follows:—

Roberts' test for eu- or lipoid-globulin.—A boiling tube (conical receiver or any other convenient vessel) is nearly filled with distilled water, and the urine is added drop by drop. In the presence of eu-globulin a milky haze forms round each drop as it diffuses into

* Serum albumin, over 70,000 by osmotic pressure methods.

† Hæmoglobin is near the borderline, and is peculiar in that it is only excreted when its concentration in the plasma exceeds a certain value.

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the water. The addition of the drops is continued till the mixed fluid is turbid throughout. Half the contents are then transferred to a second boiling tube. The first tube is left without further treatment for comparison. A single drop only of 33 per cent acetic acid is added to the second tube, when the turbidity clears at once if it be due to eu-globulin.

Proteoses may appear in the urine when absorption of partially digested pus is proceeding somewhere in the body, and during involution of the puerperal uterus. They usually occur in traces only, are often transient, and generally are of little or no clinical significance. They are precipitated below 60°C., re-dissolve on boiling, and reappear on cooling. They may be separated from other proteins by coagulation at 60°C., and filtration.

Bence-Jones' protein behaves in several ways like a proteose; it, too, comes down below 60°C., re-dissolves on boiling (but *see* below) and reappears on cooling. It, however, is not a proteose, but a full protein, in character mostly closely allied to a globulin, hence it is better to term it Bence-Jones' protein. Its presence in the urine is practically diagnostic of multiple myelomatosis, though it has been described occasionally in other diseases of the marrow. Although uncommon—it is encountered on the average about once a year in a large general hospital—it is of great clinical importance for very often it is the first sign to establish the diagnosis of the patient's illness. It is, therefore, essential to make clear the evidence on which its detection depends.

In the boiling and acetic acid test it may be noted that a precipitate forms relatively early during the application of heat, to re-dissolve on boiling and reappear on cooling. There are several reasons, however, why this behaviour may be modified or missed. The urine should be naturally acid, or made very slightly so by acetic acid; if it is carelessly overacidified the protein may not be precipitated at any temperature. It may be missed, too, by heating very rapidly. Re-solution at boiling point is frequently only partial, though it may be made complete or nearly so by correct adjustment of reaction (*see* below under heat test).

As a preliminary, *Bradshaw's HCl ring test* is useful. It is performed by superimposing a few c.c. of the urine on about 5 c.c. of concentrated HCl. Bence-Jones' protein gives a heavy curdy-white precipitate at the junction of the two fluids. The test remains positive after considerable dilution of the urine (one part with 10 or 20 parts of distilled water), unless the concentration of protein is very low. As a rule the proteinuria is marked when first detected but presumably would have been low in an early stage of the disease. If Bradshaw's test is positive the heat test described below should be carried out, to make sure of the protein, for Bradshaw's test is not specific, because any urine containing an abundance of protein will give a positive result, though commonly only a slight haze. Uroselectan in urine gives a false positive reaction. If Bradshaw's test is negative, further investigation is unnecessary, and therein lies its value as a preliminary.

The *two-tube test* is advantageous when there is doubt as to re-solution at boiling point. About 10 c.c. of urine are warmed to about 60°C., until the tube is just not too hot to grip firmly in the hand. After inversion over the thumb to insure an even temperature and suspension of the precipitated protein, half the contents are transferred to a second tube, which is thoroughly boiled. Immediate comparison with the first tube demonstrates clearly if there is any resolution, and the degree thereof.

The *heat test* is the most important, and should always be done before diagnosing Bence-Jones' proteinuria. The urine is cleared by filtering, repeatedly if necessary, and the reaction noted. If alkaline, it is made very faintly acid by the cautious addition of 33 per cent acetic acid. About 5 c.c. are placed in each of three test tubes. To the first nothing is added; to the second and third, one and two drops of 33 per cent acetic acid respectively, after which they are placed together with a thermometer in a beaker of water. The beaker is heated slowly, the water being continuously stirred, and the temperatures at which changes occur noted. In the presence of Bence-Jones' protein the urine becomes turbid below 60°C.—often between 40°C. and 50°C. After a further rise of a few degrees (but still below 60°C.) the precipitate flocculates. Ordinary albumin and globulins do not come down till over 60°C., though in their case also the reaction affects the temperature at which they are first precipitated. On boiling each of the three tubes, one at any rate will show complete or almost complete re-solution (remember, however, that proteins other than Bence-Jones' may also be present). On cooling reappearance of the protein will be evident in one at least of the tubes. Thus a composite picture is obtained of the typical behaviour of Bence-Jones' protein. Three different degrees of acidity, as described, suffice in routine work, but clearly a more elaborate series of tubes with smaller steps in reaction are easily prepared. When the conditions are not correct for complete re-solution at boiling point, it will often be observed that the protein forms a peculiar stringy, sticky, coagulum.

So-called peptonuria.—Every now and then when urine is added to Fehling's or Benedict's reagents in the test for 'sugar' it is observed that the mixture in the cold has a deeper blue, or purplish colour, than the original copper reagent. This is often due to the presence of proteins in the urine giving a biuret reaction. But a similar colour change was observed in the absence of proteinuria over fifty years ago (*e.g.*, Ralfe, 1883), and was ascribed to the presence of peptones; when the urine is super-imposed carefully on the reagent a reddish-colour-purple or rose-coloured ring is observed. Godfried has recently studied this phenomenon, and has shown that it is due neither to peptones nor to urobilin (another suggestion), but to a pigment of the urochrome group, or something associated with urochrome. The point is of interest because the practitioner must come across it sooner or later in his routine urinary examinations, but so far as the writer knows it has no clinical significance.

QUANTITATIVE ESTIMATION—ITS CLINICAL IMPORTANCE AND TECHNIQUE

It must be admitted that in routine work the physician can obtain all the guidance he requires from qualitative tests, provided that some notation be adopted to indicate roughly the concentration—large, small, or present in traces. As usual, however, such a notation implies more to the observer than to any one else, and whenever observations are to be published they will convey more to the reader if quantitative determinations have been made. Also, in following progress exact estimations are clearly more useful.

A good review of methods available for estimating protein in urine is given by Peters and Van Slyke, 'Quantitative Clinical Chemistry', Vol. II. *Esbach's method* is well known and widely used clinically, but it is important to realize that it is not strictly quantitative, and little importance should be attached to small daily variations as indicated by this means. Unfortunately, the method is rendered still less trustworthy by quite appreciable errors in the calibration of the tubes on the market. The Esbach's tube is cleaned and dried. Urine is run in exactly to the mark U, and Esbach's picric and citric acid solution to the mark R. The tube is sealed with a rubber bung and inverted several times to mix. It is left undisturbed for twenty-four hours, so that the protein precipitate settles by gravity, and the result noted. The readings give directly the grammes of protein per 1,000 c.c. of urine. Knowing the volume of the twenty-four hours' urine, the day's output of protein is calculated.

The following precautions should be observed: If the urine is alkaline it must be acidified with 33 per cent acetic acid; occasionally the original urine is so alkaline that omission of this precaution results in the subsequent precipitation being incomplete. The specific

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gravity of the urine is taken with a urinometer; if the specific gravity exceeds 1010 it is diluted accurately with the necessary one or two volumes of water to bring the specific gravity to or below 1010; the diluted urine is run into the Esbach's tube to the mark U, and next day the observed reading is multiplied by the dilution factor; omission of this precaution results in imperfect sedimentation of the protein precipitate.

In *Aufrecht's method* the protein is again precipitated by a solution of picric and citric acid, but the mixture is centrifuged for two minutes at 5,000 revolutions per minute, or for two and a half minutes at 3,000 r.p.m., or for three minutes at 2,000 to 2,500 r.p.m. It is essential to centrifuge for the prescribed time, otherwise gross errors may be introduced. As in Esbach's method, urine is added to U, and reagent to R, but in the specially designed Aufrecht's centrifuge tube, the readings giving the grammes of protein per 100 c.c. of urine. As before, alkaline urines must first be acidified with acetic acid, but the specific gravity is immaterial. Unfortunately the calibration of the tubes on sale is even worse than that of Esbach's tubes, the chief error being in the calibration of the terminal tapered part, so that two Aufrecht's tubes may give absurdly different results, particularly when the protein is less than 0.1 per cent. With a correctly calibrated tube, results can be obtained in a few minutes if a suitable centrifuge is available.

Centrifuging has also been employed in the *method of Shevky and Stafford;* the protein is precipitated by a solution of 1.5 gm. of phosphotungstic, and 5 c.c. of concentrated hydrochloric acid in 100 c.c. of 95 per cent alcohol, in a graduated centrifuge tube: 4 c.c. of urine are treated with 2.5 c.c. of reagent; the tube is closed, inverted slowly three times to mix, and allowed to stand for exactly ten minutes; it is then centrifuged for exactly 10 minutes at 1,800 r.p.m. The volume of the precipitate in c.c. is noted, and multiplied by 0.72 to obtain the grammes of protein per 100 c.c. of urine.

THE CLINICAL CONDITIONS IN WHICH PROTEINURIA OCCURS

General discussion.—Proteinuria may be one of many clinical signs or may be the only evidence of any abnormality in a subject otherwise normal. It is, of course, simply a matter of words, or of personal choice whether it be stated that normal urine contains no protein other than a trace of mucus, or whether it be stated that the urine of some healthy individuals contains protein which is of no clinical importance. Some cases of glycosuria provide an exact parallel; thus, glycosuria due to true renal glycosuria is of no moment, but until it has been shown conclusively that the condition is renal glycosuria, the urinary finding *may* be of serious import. Similarly the medical officer must remember that every case of proteinuria needs investigation before he can be satisfied that it is immaterial. The subject is discussed further under 'intermittent proteinuria'.

When there are clinical signs or symptoms in addition to proteinuria, the significance of the proteinuria must be determined in the light of such findings, and upon the conclusions drawn from the whole of the evidence will be inferred what is the probable cause of the proteinuria, and accordingly its course may be predicted. There is no foundation for a separate discussion of the prognosis or treatment of proteinuria or of any other clinical sign. It is the underlying disease or condition responsible for the clinical sign which may require prognosis and treatment.

The compilation of the huge list of all possible diseases and conditions in which proteinuria may occur would clearly be of little or no value, but it is necessary to have some sort of order in thinking of the possible causes and clinical condition when the qualitative tests for protein in the urine have been found to be positive. The writer's practice is to think in anatomical sequence from the exterior inwards, from possible contamination to lesions of the genito-urinary tract in ascending order, and, finally, to the blood and other sources from which the blood may carry protein to the kidneys. It is obvious that the responsible lesions may be situated in more than one anatomical site, as when both urethra and prostate are involved in gonorrhœa or when both bladder and kidneys are diseased in tuberculosis, and so on, but the anatomical sequence is convenient. The subject will be dealt with in that order now, a few practical points being inserted here and there under the different headings.

Contamination as the cause of proteinuria has been considered in the early part of this article.

Diseases of the external genitalia or of the urethra.—The venereal diseases, non-specific urethritis, trauma of the urethra, externally or by calculus or gravel, and so on: the heading is sufficient.

Diseases of the bladder or prostate.—Cystitis, tuberculosis, vesical calculi and growths, etc. Enlargement of the prostate and its cause. As mentioned above, an excess of mucus in the urine is most commonly due to lesions in this region, and the microscopical examination of the urinary deposit is indispensable. In chyluria, the obstructed lymphatic most commonly ruptures into the bladder.

Diseases of an ureter or ureters are uncommon causes of proteinuria, the most frequent among them being stone.

Diseases of a kidney or kidneys are generally the first to be considered, and sometimes, unfortunately, are thought of as the only cause of proteinuria; there are many causes of 'albuminuria' in addition to nephritis. The renal lesions may be classified under two headings: (*a*) kidney diseases proper; (*b*) secondary disorders of kidneys.

Kidney diseases proper.—Trauma; nephritis; tuberculosis; stone; tumour, and so on. Reference to casts and the proportion of albumin to globulin has already been made. The concentration of protein in advanced chronic nephritis may be very small and its detection important; in nephrosis, as a rule, it is high.

Secondary disorders of kidneys.—Under this heading are included vasomotor and circulatory disturbances in the kidneys themselves. Thus 'intermittent or benign proteinuria' may be classified here, but is considered in a separate section below, as also is 'proteinuria in pregnancy', many examples of which are due to congestion of the kidneys from pressure by the gravid uterus. Congestion due to a failing heart is in the same category, likewise the circulatory effects in diabetic coma. Proteinuria due to surgical shock, or to cold baths in certain subjects, comes here too. Febrile proteinuria is more difficult to place accurately. In fevers there is undoubtedly a complicating nephritis in a proportion of cases, and this would of course be classed as 'kidney disease proper'. But in much larger proportion of cases the proteinuria is transient and unaccompanied by any clinical signs of renal involvement; some at least of these proteinurias may be regarded as due to renal congestion. In a small proportion of cases, and after scarlet fever in particular, it may be difficult to assess the significance of the proteinuria, which in some instances persists for years; possibly some of these were present before the fever (*see* also under 'intermittent proteinuria'). Though febrile proteinuria is often classified, together with albuminuria, due to poisoning by chemicals, under the heading of 'toxic', it seems more logical to separate the chemical poisons and to regard their action as definitely productive of renal damage. Experimentally there is clear-cut evidence of this, and clinically the testing of the urine for protein before and after administration is a practical and useful means of detecting damage to the kidneys by such drugs as the organic arsenicals, mercury, antimony, etc., and such proteinuria is an indication for cessation of treatment. In industrial or in deliberate poisoning (arsenic, lead, mercury, etc.), the proteinuria may be significant, as when accompanied by clinical signs of kidney damage, or of uncertain import if there are no such signs, and the urine was not known to be free from protein before exposure to the risk.

Intermittent proteinuria is of the greatest practical importance, and produces problems frequently and particularly in insurance work. It is described under a

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large number of synonyms, such as orthostatic, lordotic, cyclic, benign, physiological, functional, albuminuria of adolescence, and so on. In the first place contamination of the urine must be excluded (*see* previous section), for that is often intermittent. Secondly, the subjects of this condition often show signs of cardiac or vasomotor instability, and many are 'weedy', pale, spotty, or overgrown. This type of proteinuria occurs most often at adolescence, but is not limited to that period. Theoretically there might be a slight organic lesion somewhere in the urinary tract which was drained at intervals, and a few patients with intermittent proteinuria have been observed subsequently to suffer from tuberculosis or stone. In a large number, but not all, posture influences the proteinuria. There may be no proteinuria whilst in the horizontal position, followed by varying grades of proteinuria on adopting the exact attitude. It has been suggested that in these individuals there is an imperfect vasomotor control, so that the kidneys become temporarily congested in the upright position. The proteinuria is frequently most marked during about two hours after rising, later becoming less or disappearing, and still later in the day reappearing or intensifying. Lordosis has been noted in some, and has been put forward as a cause of renal congestion, but intermittent proteinuria occurs without lordosis, and *vice versa*. If posture markedly affects its degree, it is a point in favour of the proteinuria being of no importance.

It is generally accepted that ingested proteins are invariably digested and absorbed only as amino-acids, and there is no unequivocal evidence that protein by the mouth, however large the amount, has any influence on the excretion of protein in the urine of man.

Strenuous muscular activity is well recognized as causing or increasing proteinuria intermittently, as in soldiers, athletes, members of rowing crews, etc., but does so only in the minority. Renal congestion may be the explanation, but clearly it is necessary that each case be carefully examined to exclude other and serious causes.

This brings us to the practical point of what evidence should be secured before labelling proteinuria 'benign'. Having made a thorough clinical examination, and having excluded contamination, the fact that the proteinuria is intermittent itself is a strong point in favour of its insignificance, though it has been found that proteinuria may become intermittent in the last stage of a nephritis which is clearing up, particularly after scarlet fever. If it is clearly influenced by posture, that again makes an organic lesion unlikely. To show the effect of posture, the subject is instructed to empty his bladder completely on retiring, and again one or two hours after lying in bed, and these samples are discarded. The specimens passed just before rising, and about two hours later after normal activity in the erect position, are tested. In typical cases the first urine does not, whereas the second does, contain protein, and often in high concentration. Samples later in the day, as previously mentioned, vary in protein content, but quite often the 'albuminuria' disappears after some four to six hours, to reappear later in the evening. An examination of the centrifuged deposit should always be made; all samples containing protein should be so inspected; the method has been discussed in a previous section. An occasional leucocyte, epithelial cell, hyaline cast or cylindroid may be disregarded, but red cells and all other casts should raise the suspicion of the presence of an organic lesion, until repeated and prolonged observations have justified the conclusion that they are immaterial. If it can be shown that the protein is mucus it is not likely to be of importance, but otherwise a study of the nature of the proteins is seldom of practical assistance. Renal efficiency tests are of value to exclude gross lesions, but normal findings with these tests by no means indicate that the kidneys are healthy. One or more should be carried out as a safeguard, but the decision as to whether the proteinuria is benign or indicates a mild organic lesion depends on the other evidence considered above.

Proteinuria in pregnancy is very common, and its significance in a particular case often of moment in practice. It has long been recognized that in the great majority of pregnant proteinuries the positive urinary test is of no importance, and is ascribed to congestion of the kidneys due to the pressure of the gravid uterus on the renal vessels. With the modern practice of repeated urinary examinations throughout pregnancy, it has become much easier to assess the significance of the proteinuria: any sudden increase just before term, for instance, and any change in the urinary deposit being revealed.

For a satisfactory study, especially in the last month or so, it is essential to avoid contamination by vaginal discharge by careful cleansing before micturition; catheterization may be required, but is usually unnecessary for purely chemical and cytological examinations and there is no point in running any unnecessary risk of infection.

The chief aims of the tests for protein are the detection of nephritis or other organic renal lesion in a woman who has become pregnant, and to obtain warning of the onset of pregnancy toxæmia, and especially of eclampsia.

Proteinuria without lesions of the urinary tract.—Under this heading are included the excretion of foreign proteins introduced by injection, proteosuria, Bence-Jones' proteinuria, and so-called peptonuria. All have been dealt with in previous sections.

The Use and Abuse of Manipulative Surgery

By A. S. BLUNDELL BANKART, F.R.C.S.

(From the *British Medical Journal*, Vol. II, 29th August, 1936, p. 416)

A FEW weeks ago an elderly lady told me that according to her information manipulative surgery was 'brute force and bloody ignorance'. I told her that this was the best definition I had heard. Perhaps it is significant that in spite of this she entrusted herself to me for manipulation of her spine, showing that some of the more intelligent of the public are able to distinguish between manipulative surgery and the proper use of manipulation in surgery.

I have no wish to quibble about the meaning of a word or a phrase. I have used the term 'manipulative surgery' many times, and once I so far forgot myself as to write a little book with that title. But it is a term to which I have the strongest objection, because it implies or suggests that the use of manipulation is something different and apart from ordinary surgical procedure, and that it is a peculiar method or system of treatment which is no particular concern of the ordinary surgeon or, for that matter, of any surgeon. This is not true; but we may as well admit that not so long ago it was true, or almost true. Manipulation was practised empirically by bone-setters in this country for centuries before its possibilities were realized by the medical profession. In fact, it is little more than twenty years since the conspicuous success of one bone-setter in particular forced the medical profession to take manipulative surgery seriously. Personally, I have never been afraid or ashamed to admit that my own enlightenment came from Herbert Barker—not directly, for I never saw him at work, but from the simple fact that he cured outright a patient of mine whom I had treated unsuccessfully by orthodox methods over a long period.

Many years ago I received a letter from an intelligent middle-aged woman, who wrote as follows:

'Dear Mr. Bankart,

'You may remember that two years ago I consulted you for pain in my feet due to flat-foot. For two years I had your treatment and I did everything that you told me to do. I wore the special boots that you had made for me, and the wedges, pads and supports. I had the massage and I did the exercises which you prescribed for me. But I got no better, and I began

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to fear that I should be crippled for life. Then some friends of mine persuaded me to consult Mr. Barker the bone-setter. He, with his wonderful hands, put the bones of my feet back into place, and now, I am thankful to say, I am cured. I have no pain in my feet, I can walk seven miles with ease and comfort, and I feel that a new lease of life has been granted to me'.

No doubt your first comment on this case will be that I must have treated this patient very badly, and I entirely agree. But at least I will say that I treated her conscientiously and according to the accepted principles of all the leading orthopædic surgeons of the day. Yet I had failed, and my patient had gone off to a bone-setter, who had cured her. Perhaps your next comment will be that the universal diagnosis of 'a small bone out of place' is so manifestly false that you are sceptical of cures which are alleged to have been brought about by 'putting small bones back into place'. But you must understand that 'a small bone out of place' is not a diagnosis, but a pretext. The bone-setter must find a reason or an excuse for manipulating a joint, and I must confess that I find it difficult not to take off my hat to the man who first thought of 'a small bone out of place'. Hard things have been said about the medical profession for its tardy recognition of manipulative surgery. But if bone-setters had wished to keep their work to themselves they could hardly have done better than choose a name which is misleading—for whatever else they do they do not set bones—and an explanation of their results which is demonstrably untrue.

Foot strain

In the case of my patient I had no doubt that she was telling the truth, and that, whatever the explanation, she had been cured of her complaint. I asked myself first: What did he do to her, or, for that matter, what could any man do to a foot with his hands alone? The answer was that he could do nothing except move it. How, then, could one man's movement or manipulation differ from that of another, for we had often manipulated feet, but without such dramatic results? The answer was that he could only move it with more force or in a different direction, or both.

So here was the explanation, and surely it is simple enough. It is a story that I have told so many times that I have not the face to weary you with it again in detail. It is enough to repeat that people do not suffer from flat-foot, but from inability to flatten their feet. The great majority of civilized people have acquired some restriction of the natural mobility of their feet, so that they cannot flatten without meeting with the resistance of the soft parts. When the flattening foot meets with this resistance it is strained, and the condition is painful. On the other hand, the completely flat foot is painless. The medical profession and the public have been obsessed with the idea of supporting the arch of the foot. In theory this is ridiculous, for the foot was meant to be an active, supple member, and not a rigid thing like a block of wood; and in practice it has proved a miserable failure. The bone-setter, on the other hand, smashed down the arch of the foot, or, to put it less crudely, he restored its mobility, so that it could flatten without resistance and therefore without pain, *and* he cured his patients. Most appropriately my experience has led me to mention first the commonest use of manipulation in surgery. For foot strain (not flat-foot, if you please) is one of the commonest ailments of the human body. It may be postural or traumatic in origin. It can be cured by manipulation and in no other way. See to it that you cure it, or others will cure it for you, as they have done in the past.

Now listen to a very different story. Some years ago a doctor brought his son to me with an obviously tuberculous elbow. He had taken him first to a bone-setter (not Barker), who had violently manipulated the joint, and it had flared. The doctor felt and looked a fool; but there it was. No doubt your first comment on this case will be that the bone-setter ought never to have manipulated this joint, and he knows that as well as you do, now. But how was he to know that this was a tuberculous joint, for he had had no medical or surgical training? Then, you will say, he ought never to manipulate any joint, or, in other words, he ought not to exist. Perhaps you are right; but what about my lady with the supposed flat-foot, and the countless other cases that have been cured by bone-setters after having failed to get relief elsewhere? Do not think that I am talking only of the past. I still hear of orthopædic surgeons of repute who treat so-called flat-foot with arch supports, who do not recognize sacro-iliac strain, the commonest cause of pain in the back, and who profess to be familiar with manipulative surgery but who seldom practise it. You cannot have it both ways. It is no use saying that the bone-setter ought not to practise because he is not medically qualified unless you, who are medically qualified, are prepared to undertake not merely an occasional manipulation or two, but the whole of the manipulative work that has hitherto been performed by bone-setters. How many of you who are attached to large hospitals have any organized arrangements for dealing with the large number of cases which require manipulation in ordinary orthopædic practice?

Spinal conditions requiring manipulation

After the foot, the joints of the pelvis and spine are those which most often call for manipulation in the ordinary course of treatment. I will not inflict the Americanism 'low back pain' upon you. Low back pain is about as intelligent a diagnosis as belly-ache or pain in the chest.

Sacro-iliac strain is the commonest cause of persistent pain in the lower part of the back. It is a definite clinical entity, characterized by pain in the sacro-iliac joint, tenderness on pressure over the posterior superior spine of the ilium, a sense of insecurity or weakness, and, in most cases, a normal *x*-ray picture. Pain may be referred to the outer side or front of the thigh, but never down the sciatic nerve in an uncomplicated case of sacro-iliac strain. Sometimes there is chronic arthritis of this joint associated with a similar condition of the joints of the lumbar spine. Occasionally there is tuberculous disease of the sacro-iliac joint, but this is practically never seen before there is visible evidence of bone destruction in the *x*-ray picture. So that with the simple precaution of a routine *x*-ray examination one can diagnose and treat a case of sacro-iliac strain without hesitation. We believe that sacro-iliac strain is a chronic strain or sprain with periarticular adhesions such as may occur in any other joint. Often there is a definite history of injury, and the strain is common after childbirth, but sometimes it is of gradual onset and due to faulty posture. Over 90 per cent of the cases can be cured by manipulation under an anæsthetic followed by massage and exercises. Those which do not respond to manipulation can be cured outright by arthrodesis of the sacro-iliac joint.

Chronic lumbar back strain is perhaps the next most common cause of persistent pain in the back. It begins acutely with a sharp stabbing pain during some effort or awkward movement. It is due to rupture of some of the deeper fibres of the erector spinæ muscle on one or other side. When the condition becomes chronic there is a point of local tenderness over the erector spinæ, spasm of the muscle resulting in limitation of movement, and often a considerable degree of neurosis. Practically all these cases can be cured by manipulation, unless there is an impending claim for compensation or a long-standing traumatic neurasthenia.

Spinal arthritis—that is, ostro-arthritis of the lumbo-sacral and intervertebral joints of the lumbar spine, with or without sciatica—is the third condition of the spine which in suitable cases may be treated by manipulation. We do not pretend to perform a miracle on the permanent osseous changes of advanced chronic arthritis here or in any other part of the body. But do believe that a great deal of the pain of which these

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patients complain is due to periarticular fibrosis rather than to actual changes in the joints, and that, if the spine can be made supple again, much of the pain will disappear. Forcible manipulation followed by vigorous massage and exercises is successful in about 50 per cent of these cases. It is irrelevant to add here that, when all other means fail, excision of the corresponding intervertebral joints is an almost certain cure for intractable sciatica.

THE KNEE-JOINT

Many people, I think, would say that I should have placed the knee-joint first, or at least second, in the list of those that may require manipulation. But the knee-joint, perhaps, is the one joint which is manipulated more often than it ought to be. Nowhere is the difference between manipulative surgery and the proper use of manipulation in surgery more evident. The practitioner of manipulative surgery alone must manipulate at all costs or confess himself beaten, for he has no alternative methods of treatment. The properly equipped orthopædic surgeon, on the other hand, has at his disposal all the resources of medicine and surgery, and not the least of these is the use of manipulation in suitable cases.

For many years bone-setters have claimed that they can cure cases of displaced semilunar cartilages by manipulation. It is not true; but here again we have learnt something from the bone-setter. Chronic knee-sprain can be cured by manipulation. In such cases the injury has stopped short of that gross injury which results in a torn cartilage, and has produced instead a sprain of the peripheral attachment of the cartilage. When this condition becomes chronic the patient complains of frequent stabbing pain on the inner side of the knee, occasional attacks of synovitis, and weakness of the joint. He may say that the knee gives way, or slips, or 'goes out', but there is never any mechanical obstruction to movement. These cases are common enough; the symptoms, of course, are due to fibrosis or 'adhesions' at the periphery of the cartilage, and they can be cured by manipulation; and inasmuch as they are usually diagnosed as 'slipped cartilage' by bone-setters and the public, they are largely responsible for the popular belief that displaced semilunar cartilages also can be cured by manipulation.

SEMILUNAR CARTILAGE DISPLACEMENT

We now know that a displaced semilunar cartilage is always a torn cartilage, and that when once a considerable part of it is detached and loose the only place it can go to and not give rise to immediate trouble is the centre of the joint. The freeing of a 'locked knee' by manipulation and the further displacement of the detached cartilage into the intercondylar notch may be followed in some cases by a considerable period of immunity. But it is my belief that such a cartilage always gives rise to trouble sooner or later, and that is not what I call a cure.

In the aggregate the surgeons here must have operated upon thousands of semilunar cartilages. In my experience a large proportion of the patients give a history of having put the knee out previously, it may be years before; 'but', they tell one confidently, 'that was put right by a bone-setter'. At operation one finds the typical tear of the cartilage which could not possibly have been 'cured' by any manipulation, although, as I have already said, the manipulation may have been followed by considerable period of immunity from symptoms. But that is not the whole story. We see also many cases of chronic synovitis of the knee passing on to osteo-arthritis in patients approaching middle age, who admit that many years ago they 'put a cartilage out, but that was put right by a bone-setter'. These are neglected cartilage injuries, or shall I say, cases in which manipulation has been misapplied. I feel strongly that a semilunar cartilage once torn and displaced in the knee-joint of a reasonably young and healthy individual should be removed forthwith, for if it is left it will ultimately destroy the joint.

You will hardly expect or wish me to recount all the uses and abuses of manipulation in and out of surgery. I think I have said enough to show that manipulative surgery is and must be an integral part of orthopædic surgery. That it has not always been so I am the first to admit; but we are concerned with the present and the future, and not with the past. Within the last twenty years, for the first time in history, manipulative surgery has been placed upon a sound scientific basis, and we know far more about it now than any bone-setter has ever known. The most striking thing about it is its extreme simplicity. There is no complicated pathology attached to manipulative surgery. The greater part of it is concerned with the simple inflammatory reaction of living tissues to injury —the first thing that we learn when we begin to study medicine—which, in various parts of the body, leads to fibrosis or adhesions in ligaments or muscles, limiting movements of joints, and causing pain when movements are attempted. Manipulation consists merely in moving a joint forcibly through its full range of movement, I would emphasize the point that manipulation in general requires the use of great force, and that the art of manipulation consists of applying great force effectively *and safely*. Tweaking joints is no part of manipulative surgery.

Frankly, I do not think that the bone-setter abused manipulation so much as some people would like to make out. The genuine British bone-setter, now almost a figure of the past, was for the most part an honest fellow, who did work which nobody else would do, and believed in his work and was largely justified in his belief by the results he obtained. Being entirely without medical or surgical training he could not make an exact diagnosis, and it is not surprising that occasionally he met with disaster. But that, I am charitable enough to believe, was his misfortune rather than his fault.

OSTEOPATHY AND CHIROPRACTIC

I should like to stop now; but no account of the abuse of manipulative surgery would be complete without some mention of those American stunts which go by the names of osteopathy and chiropractic. It is little more than sixty years since an obscure American physician called Still announced that it had been revealed to him by God that practically all diseases are due to slight displacements of the spine, which produce pressure on the blood vessels in the intervertebral foramina, and so cause disease in various parts of the body. He devised a series of manipulations which had for their avowed object of replacement or 'adjustment' of these so-called spinal lesions; by these manipulations, it was claimed, the pressure on the blood vessels was relieved, and the diseases resulting therefrom were cured. He called this treatment osteopathy, and osteopathy it is.

Do not let anyone deceive you by explaining that this is ancient history, and that the 'modern osteopath'—whatever that may mean—is a more enlightened fellow who has become, in fact, a 'manipulative surgeon'. This is not true. It is true that the osteopath has shifted his ground again and again as one after another of his claims has been shown to be absolutely devoid of any scientific foundation. Pressure on the blood vessels in the intervertebral foramina gave way to 'congestion', and then to 'interference with the autonomic nervous system', and latterly an attempt has been made to identify the imaginary 'osteopathic lesion' with the chronic back strain which we know so well. In treatment, too, the osteopath has shifted or extended his ground in that he may employ local treatment in addition to, but not as a substitute for, the spinal 'adjustments' which are the essential basis of osteopathic treatment. I need hardly remind you of the impudent attempt which was made a year ago to establish by law a virtual monopoly of manipulative surgery for osteopaths in this country. Osteopathy has nothing whatever to do with manipulative surgery. It is an American 'stunt' based on the unsupported

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assertion that practically all diseases are due to imaginary displacements of the spine. It has been investigated up to the hilt, and it has been found wanting.

About twenty years after Still, another obscure American called Palmer, without any medical qualifications, announced that he had made the 'discovery' that 95 per cent of all diseases are due, not to pressure on the blood vessels at all, but to pressure on the nerves of the intervertebral foramina, brought about by the same imaginary displacements or 'lesions' of the spine. He employed manipulations similar to those of Still, but he called his system of treatment chiropractic. This rival venture proved even more successful than its prototype, judging from the fact that there are far more chiropractors than osteopaths in the United States and Canada. There is little to choose between them, but it is the osteopaths particularly, with their more pretentious claims, who have tried to establish themselves in this country. It is up to orthopædic surgeons to see that these confidence tricks are exposed, and to ensure that the proper use of manipulation in surgery is taught and practised in all our teaching hospitals.

Treatment of Chronic Rheumatism

By H. LETHEBY TIDY, M.D., F.R.C.P.

(From the *British Medical Journal*, Vol. II, 29th August, 1936, p. 418)

I SHALL assume that there are three clinical groups included in the term 'chronic rheumatism'—namely, rheumatoid arthritis, osteo-arthritis, and fibrositis. I shall also assume that the term does not include acute rheumatic fever, or arthritis associated with specific infections such as gonorrhœa, or associated with gout, organic nervous diseases, or with certain other obvious factors such as hæmophilia. I shall not further define the subject of our discussion, and shall proceed to review the various methods of treatment which are available.

PRESENCE OF A SEPTIC FOCUS

All cases should be carefully examined for a septic focus, and when such is found it should receive the appropriate treatment. The opinion of the dental surgeon should be followed, but indiscriminate extraction of teeth, which is usually contrary to his advice, should be discouraged. These steps constitute the routine procedure in the treatment of most chronic conditions. But I do not agree with those who consider there is sufficient evidence for the view that bacterial action is the invariable cause of chronic rheumatism, and, in the absence of anything more definite, will accept as the cause some organism which is isolated from the stools and possesses slightly irregular sugar reactions.

Vaccines.—Those who hold that vaccine therapy is the correct treatment for chronic sepsis are justified in employing it when a definite focus is identified. But there is no justification for the routine use of vaccines in chronic rheumatism. We know that sepsis will disturb a diabetic regime, but it is not suggested that vaccines are a treatment for diabetes. No evidence that is satisfactory, or even nearly satisfactory, has been produced in support of the use of vaccines in chronic rheumatism within the definition of our discussion. It is particularly illogical to employ in chronic rheumatism irregular methods of vaccine therapy which have no support in general use.

DRUGS AND DIET

Analgesics such as aspirin may relieve aching, especially in fibrositis, though failure is frequent. Many an osteo-arthritic has faith in iodine and in 'Chelsea pensioner' for easing pain. Gold is the only drug for which a specific effect can be claimed, and its use is limited to rheumatoid arthritis. Its introduction is due to the French view that rheumatoid arthritis is tuberculous in origin, a theory which is not accepted in this country.

I have seen several cases in which there was undoubted improvement during a course of gold injections. But results are difficult to evaluate in a condition which is liable to exacerbations and remissions, and further study is necessary before its value can be accepted as established. There is a distinct risk of producing a serious form of dermatitis by its use. During a course of gold injections the local care of the joints must not be omitted.

Chronic rheumatism may develop in association with or at an age when hypothyroidism is common and the general condition will benefit from the administration of thyroid, but there is no reason to ascribe any specific action to thyroid. With regard to hyperthyroidism, Dr. Gardiner-Hill has examined extensive material and finds no evidence that it is associated with any type of chronic rheumatism.

Local treatment with drugs is almost confined to the analgesic action of methyl salicylate in rheumatoid arthritis, to Scott's dressing in osteo-arthritis, and to other similar measures. In certain types of fibrositis pain may be relieved by injections of saline or of such substances as quinine urea hydrochloride.

Diet.—There are few principles of any value, in spite of the firm belief of the public in a diet chart. The diet should be well-balanced and contain a sufficiency of vitamin. Patients with rheumatoid arthritis are often thin, and fat appears to be indicated, but increase in weight is more often associated with a remission of symptoms than attributable to the diet. In obese osteo-arthritic subjects weight should be reduced by systematic dieting. Sufferers from fibrositis know that an attack will be precipitated by special articles of diet, such as malt liquors.

LOCAL AND PHYSICAL TREATMENT

In rheumatoid arthritis absolute rest in bed is essential while there is pyrexia and the joints present the appearance of acute inflammation. Vincent Coates' phrase may be recalled: 'The treatment of every case is orthopædic from the start'. The object is to prevent or control the development of deformities and adhesions. The joints must be placed in splints and in the positions opposed to those deformities which are known to develop. The splint must be taken away and each joint moved daily. The object of this is to prevent adhesions and not for the benefit of the muscles. A single movement in each direction is thus sufficient, and the repetition which is often encouraged is inadvisable. It is essential that the joint should not bear weight during the movement, nor indeed should an inflamed joint bear weight at any time. Active movement is better than passive, especially if contractures have already developed, since it is less apt to cause injury to the joint in the early stages of treatment.

Heat is indicated in all forms of chronic rheumatism. It tends to relieve pain and stiffness of the muscles, to improve the capillary circulation, and to promote the resolution of inflammation and effusions. It may be applied locally or by electrical and balneological methods. For rheumatoid arthritis radiant heat lamps are the simplest method.

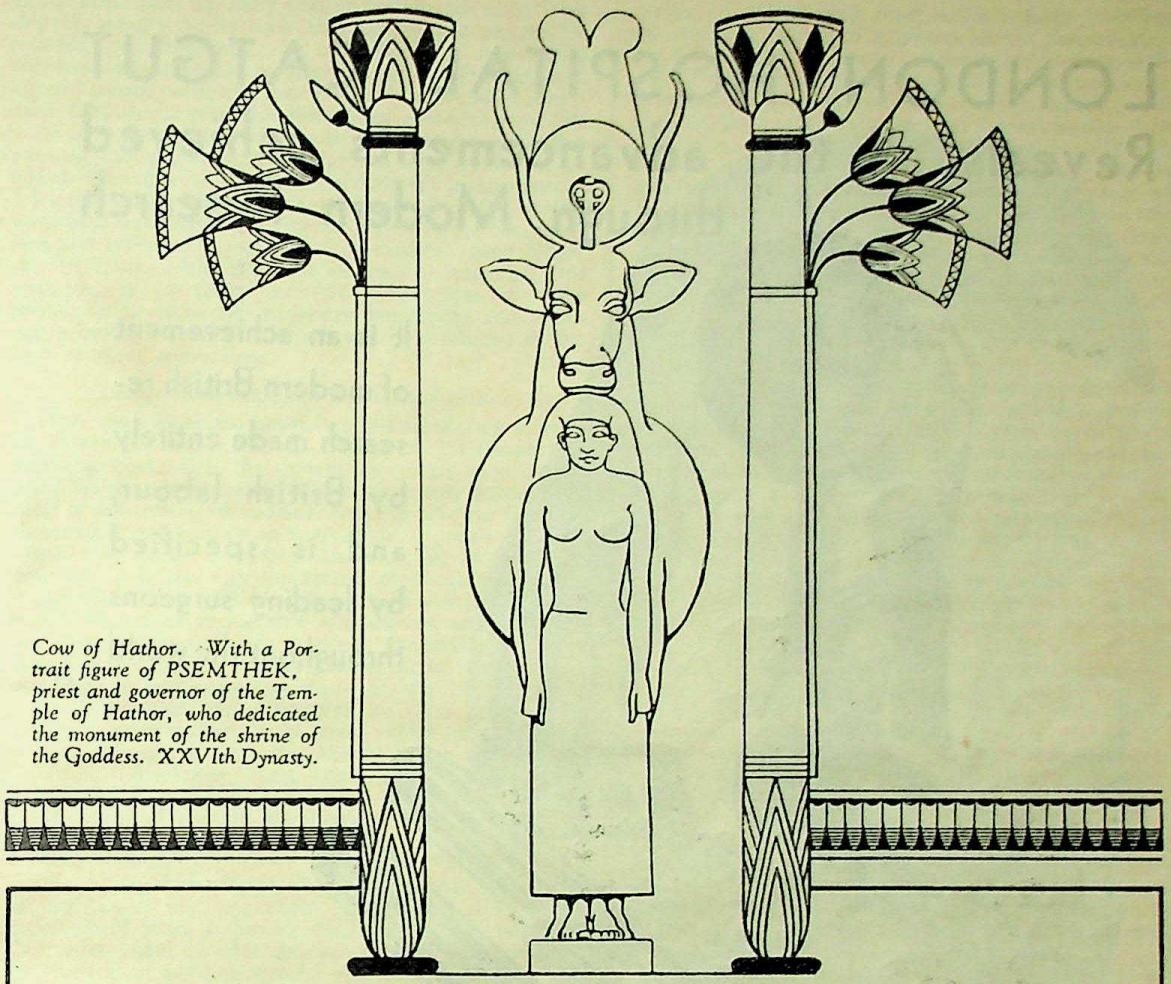
Massage is a valuable part of treatment in most forms of chronic rheumatism. It is especially helpful in fibrositis, as it assists in dispensing nodules and adhesions in muscles and deep tissues before these become organized. It also improves circulation and muscular tone, and thus is of value when muscles are tending to waste and atrophy, but it cannot affect adhesions involving joint tissues.

MOVEMENTS

Movements exercise the muscles and militate against adhesions and diminished mobility of joints. They are an integral part of the treatment of practically all types of chronic rheumatism at some stage. It should be

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Cow of Hathor. With a Portrait figure of PSEMTHEK, priest and governor of the Temple of Hathor, who dedicated the monument of the shrine of the Goddess. XXVIth Dynasty.

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emphasized that no joint should be moved while it is bearing weight, or at least that the weight should be reduced to a minimum. In osteo-arthritis movements are best employed in conjunction with balneotherapy. If pain comes on during movements or exercise it is evident that the movements have been excessive, and the same is probably true of pain developing at night. But pain on movement after a joint has been at rest is no contra-indication to the use of movement in treatment.

Massage, movements, and all methods of physical treatment and balneotherapy should be under the direction and sufficient supervision of a medical man. There can be little doubt that the degree of massage, for example, is at times excessive. Unfortunately few medical men have the necessary knowledge and training, a defect which, it is hoped, will be reminded in the next medical generation.

ELECTRICAL TREATMENT AND RADIATION

There are numerous methods of administering electrical treatment and radiation. Many are convenient for applying heat, with the undeniable result of relieving pain, though unfortunately, this is often only temporary: such is the effect of radiant heat or electric light in rheumatoid arthritis or infra-red light in osteo-arthritis. Diathermy heats the deep tissues, but it may be doubted if it has any advantage over other methods except in rapidity and for osteo-arthritis of the hip. It is not devoid of undesirable after-effects, and its value has been over-estimated; indeed, exaggerated claims have been made for the results of many methods. I can find no satisfactory evidence of any benefit from ionization or deep *x*-ray therapy.

The faradic current is of great value in the intramuscular forms of fibrositis, the muscular contractions produced dispersing and removing nodules and adhesions. It also aids the control of muscular wasting in all forms of chronic rheumatism.

BALNEOTHERAPY, MINERAL WATERS AND SPA TREATMENT

The value of treatment at spas has been recognized almost from the beginning of history. For many hundreds of years a spa depended on the reputation of its 'cures', and no attempt was made to explain how the waters or medium acted.

About eighty years ago lengthy analyses of spa waters began to appear, patients being left to draw their own conclusions. Later, the results of much so-called research were published, few of them fulfilling the canons of scientific evidence and research. The aim appears to be to prove that the good results of a certain spa are due to the presence of some substance or quality in its waters which is absent from the waters of other spas. The unprejudiced observer can feel little doubt that many spas with widely different waters and surroundings produce approximately similar results. Unless something more definite, or, alternatively something common to many spas, can be produced with scientific support, the profession and public may decide that the various claims cancel out, and that the maximum benefit from treatment can be obtained without visiting a spa.

EXTERNAL USES OF SPA WATERS

There is no evidence that there is any appreciable absorption by the skin of the ingredients of any medium used for 'baths', either water, peat, or other varieties of mud. Those who claim that the result of any balneological or spa treatment is due to such absorption have the burden of proof laid on them.

Beneficial results, therefore, depend on physical qualities and effects, such as temperature, specific gravity, consistency, and percussion. The action may be, first, mechanical. The weight on the joints is reduced and movements of weakened muscles are thus aided. This is a very important action. Secondly, it may be thermal. A warm medium will raise the temperature of the skin and increase the rate of peripheral circulation. Together with the mechanical action, this may greatly relieve pain and at the same time assist movement. Peat and mud baths combine mechanical and thermal effects to a greater extent than water, and the deep mud pools are of special value in osteo-arthritis and fibrositis. A cold medium is stimulating, as everyone appreciates from sea-bathing, but it has little part in the treatment of chronic rheumatism.

Thirdly, there is the percussion effect. This may combine the good results of heat, massage, and movements, as is shown in whirlpool baths. The same result may be achieved by the massage douche, performed with various types of needle baths and jet douches. The physical action may have some physiological effects on the kidney and cardiovascular system, but there is little evidence that balneological treatment directed against chronic rheumatism achieves appreciable results of this kind, and exaggerated claims have often been made in the past.

The effects here described are those of balneotherapy, and the treatment can be made available anywhere. In the past such substitutes for spas have too often been incomplete and on the unsatisfactory basis, by reason of the large financial outlay involved, but there is no reason why they should continue to be so.

All spa and most balneological treatment is influenced by the length of time devoted to it. Patients desire the maximum effect in the minimum of time and look for intensive treatment. They would possibly do better if they arrived at the maximum effect in the maximum time, but duration is largely controlled by the purse and by opportunity, and partly by the mental outlook of the patient. Experience has led to general agreement that a course of treatment should not exceed a few weeks, and that longer periods cause debility. But the course can be repeated after an interval.

The question of the value of the internal use of spa and medicinal waters is a thorny one. Reports of so-called researches, often widely disseminated through the post, have in the past been little more than advertising propaganda. So far as chronic rheumatism is concerned, there is at present no satisfactory evidence of any special beneficial effect, even in the presence of radio-activity. Of course the general health of many individuals will benefit from a period under a regulated regime.

Indications and contra-indications.—Balneotherapy and spa treatment for chronic rheumatism are contra-indicated in advanced diseases of the heart, lungs, and kidneys, and in all conditions of severe debility. In rheumatoid arthritis simple hot-water baths aid movements at joints help to relieve pain, but other balneological treatment in general is contra-indicated. Balneotherapy is of special value in osteo-arthritis and in the intramuscular forms of fibrositis.

The Importance and Advantages of Prescription Writing in Medical Practice

By E. FULLERTON COOK, PH.M.

(Abstracted from the *Journal of the American Medical Association*, Vol. 107, 19th September, 1936, p. 965)

A PRESCRIPTION SHOULD BE DISTINCTIVE

WHILE the ideal of medical practice is to use a single therapeutic agent of known physiologic value, it is often advisable to employ a suitable vehicle and to vary this so that the medicine may be distinctive. This applies to all forms of medication, such as liquids, powders, capsules and ointments. A pleasant flavour, an odour that suggests something other than a medicine, an added colour are all legitimate enhancements to a prescription and make the medicine less likely to be duplicated. Those who deal with the sick are conscious of the influence of suggestion; a belief in the physician and his treatment is a powerful influence for relief and cure.

ADVANTAGE OF CO-OPERATION BETWEEN THE PHYSICIAN AND THE PHARMACIST

If the physician in practice is unfamiliar with suitable flavours, colours and vehicles, he has a tendency to order ready-made preparations rather than to write a

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prescription containing the ingredients desired. Other factors that sometimes lead to 'ordering' in place of 'prescribing' are complexity of the pharmaceutical problem involved or lack of information as to dosage, solubility, chemical reactions and other factors.

In these strictly pharmaceutical problems the skilled pharmacist can often help the physician. He can also supply information concerning manufactured medicines, and co-operation with a competent pharmacist will frequently prove beneficial to the patient.

The intensive training of the physician and the elaborate machinery for preparing, standardizing, checking and distributing medicinal substances are all animated by the needs of a patient. To meet this situation there comes the physician, skilled in diagnosis, familiar with the most effective methods of treatment and having at his command a knowledge of the action of medicinal substances and knowing when they are indicated. But his medical skill frequently cannot function effectively if there are not available the carefully prepared and standardized ingredients for his prescriptions, already produced by expert pharmacists, chemists, bacteriologists or biologists, and made available through the pharmacist in the hospital or the community.

IMPORTANCE OF THE SCIENTIFICALLY CONTROLLED MANUFACTURING LABORATORY

In the background there must stand to-day the manufacturing laboratories, with efficient equipment and rigid control over every step of manufacture. These must produce standard inorganic and organic chemicals, such as ether, potassium iodide and sodium salicylate, complex synthetics such as arsphenamine, biologicals such as diphtheria antitoxin and rabies vaccine, biologically standardized pharmaceuticals, including preparations of digitalis and pituitary, sterile products for parenteral administration and the hundreds of other needed chemicals and pharmaceuticals.

The trained pharmacist serves as a liaison officer in the hospital, the medical centre and the community. His specialized knowledge concerning the available medicines should be of inestimable value to the physician in both the selection of medicines and their combination.

THE PRESCRIPTION FOR THE INDIVIDUAL

The prescription written for the individual patient is an important link in a perfected service. An original prescription shows evidence of professional skill and is not a product with which the patient is already familiar through its display in the type of medicine store where no professional knowledge is present and where such standards must necessarily be low.

The latter situation is worthy of serious consideration, for the patient is likely to question the justification for a doctor's fee when it results in what may appear to be a 'patent medicine' type of treatment. Physicians are also realizing that the patient is almost certain to recount his or her experience when talking to friends, perhaps to the discredit of the doctor. Even the naming of such trademarked medicines under these circumstances often leads those who hear the discussion to buy the same medicine to relieve self-diagnosed symptoms. The alarming increase in the use of hypnotics, without medical advice, illustrates this danger.

The use of abbreviated official titles written into a prescription and with a 'non rep.' order controls the situation, while the suggestion to 'buy it at the drug store' opens wide the door to self-medication.

OFFICIAL MEDICINES NOW LARGELY USED

In proposing the use of official medicines on prescriptions it is not being suggested to physicians that they seriously modify the present-day custom of most doctors. In a scientifically conducted survey of the actual ingredients used by physicians in their prescriptions during 1931-1932, a study covering typical communities throughout the United States and including 121,294 prescriptions, Gathercoal reported that 65.19 per cent of the ingredients in these prescriptions were official in the U. S. P. X, 7.92 per cent were in the National Formulary, 16.05 per cent were proprietary specialities and 10.84 per cent were unofficial items. About the same time the author of this paper found by a study of the catalogues of physicians supply houses that a preponderant proportion of the ingredients used in their formulas were official in the U. S. P.

The Pharmacopœia of the United States was founded by physicians in 1820 as a therapeutic guide to the profession. It has endeavoured to maintain that position for more than a hundred years. Its preparations were the basis for the teaching of therapeutics in medical schools for almost a century and now they constitute the large majority of those therapeutic agents recommended by the American Medical Association in Useful Drugs as a present-day therapeutic guide for medical schools.

PHYSICIANS AND THE PHARMACOPŒIA

The Pharmacopœia invites the physicians of the country to assist in maintaining it as a reliable guide to the medical profession in the field of therapeutics. If items now official are unreliable they should be deleted; as important new remedies are developed these should find a place in the Pharmacopœia by 'interim revision'.

It is believed that, with a study of the ingredients official in the new Pharmacopœia, especially when supplemented by the National Formulary tablets, ampules and elixirs of U. S. P. drugs, including such preparations as Elixirs of the Bromides, of Barbital, Phenobarbital and Aminopyrine respectively, and the Sprays and Jelly of Ephedrine, physicians will find a wide range of medicines for practically every therapeutic need.

OFFICIAL MEDICINES IN HOSPITAL TREATMENT

Emphasis should also be placed on the restriction of routine hospital treatment to official medicines whenever possible, since this has been demonstrated to be a policy which is scientifically and economically sound.

PRESCRIPTION WRITING BY HOSPITAL INTERNS

This programme for the hospital has within it another possibility of far-reaching significance. It is realized that the medical student has little opportunity in his crowded curriculum to become familiar with official titles or even to gain practice in prescription writing. Insufficient information and training in these two fields as well as the use of certain types of hospital formularies and lack of co-operation between the house and visiting medical staffs help to explain the failure to write more prescriptions for official medicines. This is being recognized by a number of hospitals, and both medical and surgical interns are being given regular training in the use of official medicines and in prescription writing. The appreciative response, where this course has been well conducted, is gratifying and is apparently justifying itself by the increased efficiency and ability of the younger physicians having this added training. The medical staffs of many hospitals have developed their own 'formulary' as an aid in the efficient and economic use of medicines within the hospital. The prescriptions in such a 'formulary' should never be given by numbers, as this practice has led to both carelessness and mistakes. In the coupling of such a 'formulary' the official titles of drugs, chemicals or preparations, or their official abbreviations, should be used so that the younger physicians on the staff may become increasingly familiar with these established medicines.

THE PRICE OF A PRESCRIPTION

The price of a prescription is no small item for consideration in the total cost of medical care. It should be the basis for a complete understanding and must be established on a sound and economically correct foundation.

It is proper that the patient should pay for the medicine and that it should not come out of the physician's fee, for that is not economically sound and

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leads to numerous abuses. Many physicians to-day are being persuaded to start the practice of office dispensing. There are conditions in which this is justified, as in a country district where there are no prescription-filling facilities; but that it introduces the possibility of many complications must be conceded, and most physicians return to prescription writing as soon as financial pressure is relieved.

However, to return to the price to be charged for the prescription: when the pharmacist is called on to utilize his professional skill and equipment in supplying the medicine ordered by the physician or when he has prepared the medicines beforehand in his laboratory, using his training and equipment, there is justification for including a reasonable professional fee in the price to be charged the patient.

THE REFILLING OF PRESCRIPTIONS AND THE GIVING OF COPIES

An argument sometimes advanced against the writing of prescriptions is based on the belief that the patient often continues the use of the medicine long after it was intended by the physician by having the original prescription refilled and by even giving copies of the prescription to friends.

If a physician prefers that the prescription shall not be refilled except on his order, it is the common practice to add to the prescription the abbreviation 'non rep.' and his injunction will be honoured by the pharmacist.

This 'non rep.' order should never be printed on a blank prescription. It has a different significance when written on the prescription by the physician. The pharmacist can assist by attaching a special label to the filled prescription indicating that it is nonrefillable. In such cases 'a copy' of the ingredients should not be placed on the package.

SUMMARY

The welfare of the patient is often aided by the administration of a properly selected medicine. A distinctive prescription, written for the needs of a specific patient and using official drugs or preparations whenever these are available, is desirable.

The skilled professional pharmacist can often be helpful in the selection and combination of medicines.

The judicial use of the 'non rep.' order on prescriptions and the employment of official titles will assist in the control of objectionable self-medication.

Reviews

A SYNOPSIS OF HYGIENE.—By W. W. Jameson, M.A., M.D. (Aberd.), F.R.C.P., D.P.H., and G. S. Parkinson, D.S.O., M.R.C.S., L.R.C.P., D.P.H., Lieutenant-Colonel, R.A.M.C. (Retd.). With a Section on Personal Hygiene. By G. P. Crowden, M.Sc., M.R.C.S., L.R.C.P. Fifth Edition. 1936. J. and A. Churchill, Limited, London. Pp. viii plus 623, with 17 illustrations. Price, 21s.

THE general excellence of Jameson and Parkinson's *Synopsis of Hygiene* is better shown by the fact that a new edition is called for every two or three years, and that it has now reached its fifth edition, than by anything that the reviewer can say about it. It remains for him to endorse the general opinion and to indicate the general scope of the book and the extent to which it should be of value to those working under Indian conditions, instead of the English conditions for which it is primarily written.

The book is a synopsis of all those subjects, excepting bacteriology and chemistry, studied during a course for the Diploma in Public Health. It is not possible to put more than a synopsis of nine months' work into one volume, but the authors have made this volume of great value as a general textbook by documenting it fully with references to official and other publications with which the reader can fill in the very solid outline they provide. In most similar textbooks it is usual to find the main emphasis laid on such routine matters as food inspection, provision of water supplies, removal of refuse, with a minor emphasis on the epidemiology of disease. In the book under review the epidemiology and control of disease, the causation and prevention of maternal and infantile mortality, and the essentials of healthy living in the form of food, clothing and personal hygiene, warmth, light and air are the main interest of the authors; it is their treatment of these subjects which puts their work far in advance of others. They deal fully with the routine duties of a medical officer of health, but it is a pleasure to see these in their proper perspective as a means to an end rather than as an end in themselves.

All those conditions which a medical officer of health in India might be expected to meet are dealt with in this volume, accurately and with sufficient references to original sources to enable the student to elaborate his knowledge, but it is natural that those which are principally tropical should be less fully described than those which are principally found in temperate countries. Most diseased conditions are both tropical and temperate, their incidence differing only in degree, and the work should therefore be invaluable in India, but it should be regarded as an invaluable addition to, and not a substitute for, a training in tropical hygiene. There must be few medical officers engaged in public health practice who can afford to dispense with its help.

The chapter on public health law, which includes the Consolidating Public Health Act passed only a few months ago, gives a very full and clear account of the state of the law in England and is an almost essential guide to anyone wishing to understand it. To the worker in India this chapter is mainly of interest as an indication of the general lines along which we may hope to direct public health law in India when it is fully realized how necessary a legal backing is to any effort to improve the public health.

G. M.

ENDOCRINOLOGY IN MODERN PRACTICE.—By William Wolf, M.D., M.S., Ph.D. 1936. W. B. Saunders Company, Philadelphia and London. Pp. 1018, with 252 figures. Price, 42s.

OF the many contributions made during recent years to our knowledge of medicine, perhaps the most significant are those pertaining to the domain of endocrinology. The physiology and biology of the glands of internal secretion are now better understood, the chemical nature of the hormones is better recognized, and active extracts or pure principles have been isolated from many of them. The various diseases or symptom complexes associated with dysfunction of one or more of these glands can therefore be studied with much more precision than was possible at the beginning of this century. The literature on the subject however is so vast that it is difficult even for the specialist or the research student to keep abreast of all useful information. Dr. Wolf's book is an attempt to present the clinical phase of endocrinology in a 'comprehensive and authoritative manner, yet free from burdensome, technical and theoretical considerations'. The author is to be congratulated on what he has achieved.

The book has been divided into three major sections. The first section deals with the anatomy, physiology and biology of the glands; this is followed by a description of the disease entities in a manner and sequence most likely to be met by the physician during the course of his practice. In the second section is set forth the endocrine aspects of 'non-endocrine' diseases and the third part is taken up with the procedure and methods to be followed in the diagnosis of the various endocrinopathies. The various theories and hypotheses

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are not presented with a bias, but sympathetically and stimulatingly. A very useful feature is the introduction of summaries of the whole subject in a tabular form at the end of each chapter. This facilitates rapid review of the salient points. Not less important for the everyday practitioner is the chapter on commercially available endocrine products and the treatment of the various endocrine disorders; the author appears to be generally optimistic and has shown a good deal of reliance on 'substitution therapy'. In view of the too frequent disappointments encountered, many practitioners treating such conditions would not be in agreement with the author on certain points in this regard.

The book is full of pertinent information on the subject. The remarkably lucid presentation keeps the enormous number of items correlated in an almost perfect unit and the student is properly orientated at all times. The book is worthy of the attention of all interested in endocrinology in modern practice.

R. N. C.

A TEXTBOOK OF SURGERY.—By John Homans, M.D. Fourth Edition. 1936. Charles C. Thomas, Springfield, Illinois, U. S. A. Pp. x plus 1267. Illustrated. Price, $8.00

THE opinion of a consulting physician would probably be that this work raises surgery to the dignity of medicine, and indeed, in interest, literary style and soundness of doctrine it deserves to rank with the classics. The illustrations, mostly by Willard C. Shepard, remind one of the beautiful woodcuts in Bland-Sutton's books, and are enlivened by occasional bright sketches of the way in which certain accidents happen. The publishers are evidently proud of their handiwork, for a quaint little notice gives technical details of the paper, printing and binding.

In the orthodox way, chapters on general principles are followed by regional descriptions, and a very pleasing feature is the inclusion, at the beginning of each chapter, of a short historical note, which whets the reader's appetite for the heavier, but always attractive and digestible, fare to come.

New matter includes an excellent chapter on the sympathetic nervous system, which is pleasantly cautious, and among other things points out that presacral neurectomy for megacolon in boys may render them impotent later, while the chapter on amputations and plastics is a model of well-reasoned soundness. The chapters on the central nervous system are some of the best in this, or in any book, and in them one detects the master hand of Harvey Cushing. Certain other sections might be brought more up to date, for instance, in the article on cleft palate there is no mention of post-Langenbeck operators such as Veau and Wardill, and the hormone treatment of undescended testicle and chronic interstitial (cystic) mastitis is not referred to. The treatment of fractures might be described as bloodless with a Böhler influence, and, although bone-plating is not mentioned, many English and Indian surgeons feel that the method has its uses.

All the information required in a first-class textbook is given, but given with such charm and humanity that the student hardly realizes he is learning, so learns all the better, for this is no full catalogue of facts and methods, but a real attempt to make the reader into something nobler than a mere licensed craftsman, and to give him that true insight into the cause of things without which he cannot hope to cure them.

H. W.

AN INTRODUCTION TO SURGERY.—By R. Morison, M.D., F.R.C.S. (Edin.), F.R.C.S. (Eng.), M.A., D.C.L., LL.D., and C. F. M. Saint, C.B.E., M.D., M.S., F.R.C.S., F.R.A.C.S. 1935. John Wright and Sons Limited, Bristol. Pp. ix plus 367. Illustrated. Price, 15s.

IT was a pleasure to find this book to be really what its title implied and not another addition to the plethora of cram books which already exist on the subject.

No attempt has been made to achieve completeness nor to furnish academic detail; the aim is to introduce the atmosphere and general principles of surgery to the student and to encourage him to think out his problems. The text is written in an easy yet impressive style and is augmented where emphasis is necessary by accounts of personal cases and by well-reproduced illustrations.

The student commencing his clinical work would be well repaid if he were to study this book. He would get a foundation for his future study which the heavy standard works do not attempt to supply yet, which is so important for his proper appreciation of the subject.

J. C. D.

HANDBOOK OF SURGERY.—By E. C. Mekie, M.B., Ch.B., F.R.C.S. (Edin.). 1936. E. and S. Livingstone, Edinburgh. Pp. xii plus 699. Illustrated. Available from Messrs. Butterworth and Company (India), Limited (Publishers), Calcutta. Price, Rs. 9-6

THIS is a book offering the student and post-graduate a means of quick revision of the whole subject of surgery within a small compass. Excess of detail has been avoided and the information given is accurate, if not very full. The writer has succeeded in avoiding the tabular type of presentation so familiar in other cram books, and has made his text quite readable.

As the arrangement is the classical one, the book could be used in conjunction with any of the larger works. Such a practice is, however, of doubtful value. It would be better to restrict the use of books of this type to rapid last-minute revision.

J. C. D.

ROENTGEN INTERPRETATION. A MANUAL FOR STUDENTS AND PRACTITIONERS.—By G. W. Holmes, M.D., and H. E. Ruggles, M.D. Fifth Edition. 1936. Henry Kimpton, London. Pp. 356. Illustrated with 243 engravings. Price, 22s. 6d.

THE authors have found it necessary to produce a fifth edition of this small book on radiological diagnosis so it must be in fairly constant demand.

The first chapter is devoted to shadows caused by various superimposed bodies, such as those in the clothes, also calcifications, deposits of metallic salts and other causes of shadows that may lead one astray, and the second chapter deals with anatomical variations in the skeleton. These chapters are short but will repay careful study by the novice as they will serve to guide him past the principal pitfalls into which an inexperienced observer is liable to fall in interpretation of *x*-ray plates.

The next five chapters deal with the bones and joints and include the appearances caused both by injury and disease. In the chapter on pathology the reviewer was startled to observe a figure of the head of the tibia labelled, 'Coccidiosis in a child', but on reference to the text he was relieved to find that the paragraph with the introductory word *Coccidiosis* in black type began as follows:—'Coccidiodes is a chronic granuloma due to the Oidium coccidium.....'. It is difficult to see how 'coccidiosis' can be derived from this name as it is always the generic and not the specific name that is employed in manufacturing names for parasitic diseases. One does not of course expect a specialist in radiography to be conversant with the niceties of parasitological nomenclature, but it is felt that it would have been possible to have avoided such an error as the above without much trouble. Such mistakes are regrettable because the influence of the printed word is so powerful on the minds of many uncritical readers. Do we not constantly hear the remark, 'It must be right; I saw it in a book' no matter how impossible the statement under discussion may be?

The chest, the gastro-intestine and the genito-urinary tract each occupy a separate chapter and there is a short chapter at the end describing the use of the fluoroscope.

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Decline and Fall of the Undescended Testis

GROUP	TYPE	CASES	RESULT
I Adherent Normal Testis Normal Child	Unilateral - -	5	Failed
II Subnormal Testis Subnormal Child	Bilateral - -	6	Cured
	Bilateral c hypospadias - - -	2	
	Unilateral - -	3	
III Subnormal Testis Normal Child	Unilateral - -	3	Cured
	Bilateral - -	3	Improved

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Lancet p.999, May 2, 1936.
A Report on 25 treated cases.

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This is a short book as it only occupies 356 pages counting from the title page to the end of the index and much of the space is covered by text-figures. It is little more than a summary of the subject, but it is a very good summary and is all that a general practitioner or student needs to keep him abreast of the advance of radiological diagnosis, and it offers the chances of amplifying its pages by a useful bibliography at the end of each chapter.

The price is perhaps somewhat high for a non-essential book to the general practitioner but this is probably unavoidable as the numerous beautiful photographic reproductions necessitating the use of heavy art paper must have inevitably led to high cost of production.

CUSHNY'S TEXTBOOK OF PHARMACOLOGY AND THERAPEUTICS OR THE ACTION OF DRUGS IN HEALTH AND DISEASE.—By C. W. Edmunds, A.B., M.B., and J. A. Gunn, M.A., M.D., D.Sc., F.R.C.P. Eleventh Edition. 1936. J. and A. Churchill Limited, London. Pp. 808, with 70 Illustrations. Price, 25s.

THE original author's connection with this well-known book ceased with the preparation of the eighth edition which appeared in 1924 as he died suddenly in 1926. The present joint authors have been responsible for the three subsequent editions.

All books on pharmacology to keep up to date have perforce to be revised when the official lists of drugs are so dealt with and the tenth edition appeared in 1932 to bring it into line with the new edition of the British Pharmacopœia in that year and this edition has appeared to keep pace with the United States Pharmacopœia which was revised this year.

Apart from the omission of some drugs and addition of others necessitated by the changes the book on the whole maintains its former character. The authors complain that a strictly logical and scientific arrangement of the substances used in therapeutics is not possible. We are in complete agreement with this statement but feel that possibly atebrin and plasmoquin might have been more logically dealt with than placed at the end of the section under quinine and under the page heading of that drug.

It is also felt that tetrachlorethylene, a drug of proved anthelminthic value, might have been included in this section and that hexylresorcinol should have been mentioned here also, and the only comment on its anthelminthic value not included in the discussion of this drug as a urinary antiseptic.

The value of carbarsone as a drug in the treatment of chronic amœbiasis is not in our opinion sufficiently emphasized and the bibliography on this section does not include any of the references to the work of Chopra and his assistants on this subject.

This is one of the best books in the English language on the uses and actions of drugs and is strongly recommended by the reviewer as a standard book for students or for reference by practitioners. The above criticisms are offered in the hope that the book might be still further improved for workers in the tropics if the authors kept closer watch on the work done in tropical countries and recorded the results in a little more detail.

MANUAL OF PHARMACOLOGY.—By the late W. E. Dixon, M.A., M.D., B.S., B.Sc., D.P.H., F.R.S. Eighth Edition, revised by W. A. M. Smart, M.B., B.S., B.Sc., M.R.C.S., L.R.C.P. 1936. Edward Arnold and Company, London. Pp. viii plus 483. Illustrated. Price, 18s.

SINCE its first appearance, the *Manual of Pharmacology* by Professor Walter E. Dixon has been considered as one of the standard textbooks on the subject and has enjoyed a wide popularity in the English-speaking countries. The untimely death of Professor Dixon prevented the appearance of a new edition for over seven years. Pharmacology has made such rapid strides during this period that a revised edition, bringing the subject matter up to date and in line with the modern development of the subject, was urgently called for. The publication of the eighth edition, revised by Dr. W. A. M. Smart, is therefore very opportune and will undoubtedly be welcomed by students and teachers alike.

To write a new book is admittedly a difficult task; to revise and edit a book from the master hand of Professor Dixon is not only a difficult but a delicate task. The pruning, addition, alteration and 'touching up' have all to be carried out with a good deal of tact and judgment, and it is not always easy to decide as to where to stop. Dr. Smart is to be congratulated for the careful way in which he has performed his duties. He has recast, rewritten and revised a considerable portion of the text, so much so that to a casual reader the book would appear to be a new one, not a new edition of the original Dixon. A careful reader however would find plenty of evidences of the original and the personality of the man behind the book is still to be found.

One feature which attracts immediate notice is the introduction of much organic chemistry. This is very helpful in bringing into prominence the interrelationship between chemical constitution and pharmacological action. Extensive changes were naturally needed in those topics in which there have been important and noteworthy developments. Chief among these are sections dealing with hypnotics, pre-anæsthetic medication, ergot, respiratory drugs, antipyretics, synthetic and anti-malarials. As is common with almost all the books written by Western scientists, topics of interest to students in the tropics have not received exhaustive attention. The vitamins, hormones, sera and vaccines have all been treated in a small chapter. In view of the growing field of utility of these preparations, it would seem desirable to allot a little more space to these subjects.

The book is well printed and the arrangement and grouping of the various headings and sub-headings leave nothing to be desired. We have no hesitation in recommending it to students and medical practitioners, in fact, we consider that it should form part of every medical man's library in this country.

R. N. C.

A TEXTBOOK OF PHYSIOLOGY.—By H. E. Roaf, M.D. (Toronto), D.Sc. (Liverpool), M.R.C.S., L.R.C.P. Second Edition. 1936. Edward Arnold and Company, London. Pp. viii plus 679. Illustrated. Price, 21s.

THE manner of presentation as well as the amount and selection of matter are both important in the compilation of a textbook of physiology. The author presents the subject in a manner different from the usual tradition. The book is divided into four parts. The first and second parts deal with the mechanical and chemical activities of the living organisms; the third with the mechanism and regulation of these activities through the nervous system and the endocrine organs; and the last with the maintenance of the individual and the reproduction of the species. This arrangement is likely to give a connected idea of what physiology aims at teaching. Useful information has been incorporated and tiresome details avoided. The diagrams are clear and the description of the experiments is simple. On the whole this is a useful book for the student and we congratulate the author and the publisher on its production.

P. D.

APPLIED DIETETICS: THE PLANNING AND TEACHING OF NORMAL AND THERAPEUTIC DIETS.—By F. Stern. 1936. Baillière, Tindall and Cox, London. Pp. xxi plus 263, with 52 tables. Illustrated. Price, 16s.

IT will be many years before we can hope to get a textbook on dietetics written to meet conditions in India and containing tables based on analyses of local foodstuffs. We must therefore turn to those of other

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countries. The supply of these is increasing rapidly but each of the examples that we have seen has its own individual features that will make a special appeal to each different class of reader.

In this new book there are a number of outstanding features, but one that will appeal to the teacher and sanitarian is the number of the diagrams, drawings and tables that will be useful both for the lecture theatre and the popular health exhibitions.

The first part of the book consists of chapters on daily requirements, the construction of normal and therapeutic diets, and the education of patients on normal or therapeutic diets. Part II consists of tables designed to simplify the computation of a diet. Part III gives dietary outlines which form the basis of a normal diet and of diets for various abnormal and diseased conditions. Part IV gives simple menus for healthy people at different ages and on different economic scales, and for certain diseased conditions, such as nephritis and diabetes, colitis and constipation.

The reader will find this a very handy and practical textbook on dietetics. Its usefulness in India will be limited only by the fact that reference is not made to many of the important foodstuffs of this country and that the tables of nutrition requirements will also be misleading and will have to be modified for Indians. However, seven-eighths of the information given is directly applicable to local conditions and the book will form an invaluable addition to the library of the physician or sanitarian.

L. E. N.

DISINFECTION AND STERILIZATION.—By E. C. McCulloch, M.A., D.V.M., Ph.D. 1936. Henry Kimpton, London. Pp. 525. Illustrated with 53 engravings. Price, 25s.

THE information embodied in this volume is of immense interest to those who are engaged in the study of bacteriology, systematic or applied. Although the subject is of a highly technical nature yet the author must be congratulated on his lucid way of dealing with the various chapters of this book, so much so that the entire work reads more like an interesting novel than a highly complex volume on bio-physico-chemistry.

The history of the use and development of antiseptics from the days of the ancient Egyptian kings to the present twentieth century is of great interest: in fact, the whole of the first chapter will appeal to even a lay person and the chronological order of arrangement is worthy of an historian of no mean merit. The subsequent chapters deal with the various factors which keep down the bacterial population in nature and the best means of utilizing heat, light, electricity and chemicals in sterilization and disinfection: of these the chemicals have been dealt with more fully and their comparative efficacy and modes of action analyzed and explained very thoroughly. As a book of reference for the worker in bacteriology this volume may be called a veritable mine of information: for those who are engaged in the administration of public health the chapters on water purification and sewage treatment offer many practical and valuable hints which can be adopted or slightly modified to suit local conditions. The undergraduate student of bacteriology will perhaps find the book heavy reading, but those who intend taking up higher studies in the subject will be well advised to keep a copy of this book, for herein will be found many points of interest which are not usually found in a standard textbook of bacteriology. The last chapter of the book is very instructive in so far as it deals with the almost futile use of antiseptics in medical or surgical practice without actually dogmatizing on any particular method of treatment. The few suggestions and hints laid down are very rational and strictly scientific.

K. P. B.

Abstracts from Reports

REPORT OF THE SUDAN MEDICAL SERVICE FOR THE YEAR 1935

Subjects of special interest

(a) *Interim report on kala-azar investigations (by Sir Robert Archibald, Adviser in Medical Research)*

IN view of the possibility of kala-azar being conveyed from man to man by blood-sucking insects, it was important to ascertain whether leishmania parasites were present in the peripheral blood of cases of kala-azar in all stages of the disease. A thorough examination of 190 peripheral blood films taken from 31 cases of kala-azar showed parasites present in two cases = 6.4 per cent. In each the parasites were found phagocyted within a polymorph and mononuclear leucocyte respectively. One case contracted the disease in the Fung, the other case in Eastern Mongalla.

Nasal swabs from 22 cases showed leishmania in seven cases = 31 per cent. In two cases heavy infections were found.

Examinations of fæces, centrifuged urine and conjunctival secretions of cases of kala-azar proved negative for leishmania.

Examinations of viscera of dogs, cats, ground-squirrels, fowls, gekkos and lizards in kala-azar villages proved negative for leishmania parasites.

Examinations of large numbers of wild sand flies, mosquitoes, house-flies, lice and bed bugs caught in kala-azar huts and in the kala-azar ward of Singa hospital showed no evdience of leishmania parasites or their cultural forms.

Epidemiological data collected strongly indicate 'the contact factor' with or without an intermediate host as an important factor concerned in the endemiology of a disease which, so far, has not appeared in epidemic form.

Examination of all contacts of cases of kala-azar is an essential measure in the control of the disease; it will serve to detect early cases as well as cases which are not seeking medical treatment; such cases, as proved at Daragil, assist in maintaining infection in villages.

In two instances young infants born of mothers suffering from kala-azar showed no signs of the disease four to six months after birth.

No evidence has been found or exists that dermal leishmaniasis occurs in the Fung or Rahad district.

Oral leishmaniasis is probably more common than is suspected. One case admitted to hospital for necrosis of the jaw showed leishmania in a slightly enlarged spleen, numerous parasites in nasal swabs, and one parasite phagocyted in a leucocyte was found in the peripheral blood.

Animal experiments

Grey monkeys have been infected by subcutaneous inoculation. Leishmania parasites have been found in nasal swabs taken 21 days after intraperitoneal inoculation.

Grey monkeys have been infected by nasal swabbing and nasal spraying of infective material. Two out of five healthy monkeys contracted kala-azar infection when placed in contact with five experimentally infected monkeys in an insect-proof room.

(b) *Vitamin 'A' prophylaxis for cerebro-spinal meningitis (by Dr. N. L. Corkill)*

In 1934 an epidemic of a severity hitherto not experienced swept Eastern and Central Kordofan and, when it closed with the advent of the rainy season, its spread had reached the neighbourhoods of Dilling and Heiban.

A further epidemic affecting the whole Nuba area was forecasted for the next dry season (commencing

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October 1934) on three grounds, (*a*) the dispersal of carriers on the abolition of the quarantines, (*b*) the lack of recent meningitis experience in the population as a whole, and (*c*) the economic depression since 1931 coupled with an apparent neglect of food crops by the Nubas for the more attractive money crop of cotton, the growing of which had developed at a phenomenal rate.

On account of (*c*) it was decided to attribute the unprecedented severity of the 1934 epidemic to sub-nutrition and to apply an experiment to assess the value, if any, of Mellanby's 'anti-infective vitamin A' as a prophylactic.

The expected epidemic occurred, the vitamin concentrate Essogen was procured and two experiments were conducted.

The results were inconclusive but favourable rather than unfavourable to the drug being of value.

There is, however, a further point in its favour. The incidence rapidly declined in medicated communities as a whole, as compared with the controls as a whole, but the mortality rate in the medicated was greater than that in the controls, the explanation probably being that persons on the border line of susceptibility were saved from infection by vitamin and thus mortality became more concentrated in the marasmic remainder. Now, on analysing the data amassed during the epidemic it was found that, when incidence increased but mortality decreased, a factor was at work increasing susceptibility, and conversely that, when incidence decreased but mortality increased, a factor increasing susceptibility was being removed. Assuming this to be a valid law and applying it to incidence and mortality comparisons as between the medicated and the control groups, it is seen that in the former a factor increasing susceptibility was being removed; this factor would appear to be a deficiency of vitamin A.

Viewing these results in academic isolation, they do not constitute a strong case for the use of Essogen. Viewing them in relationship with what is known of the diet and diseases of Sudanese and what has been published, they form a practical justification for further experiment and the immediate adoption of the routine use of a vitamin-A concentrate in outbreaks of meningitis and pneumonia amongst prisoners, troops and institutions of the nature of schools.

REPORT OF STACK MEDICAL RESEARCH LABORATORIES
BY DR. E. S. HORGAN

The Stack Medical Research Laboratories, built in 1927-28 as a memorial to the late Sir Lee Stack, formed the bacteriological unit of the Wellcome Tropical Research Laboratories organization. With the retirement of the director and the subsequent decentralization, the laboratories became an integral part of the Sudan Medical Service from the 1st April, 1935, thus forming the nucleus of the present laboratory services. The activities of the laboratories may be classified under three main heads:—

RESEARCH

Having been incorporated in the Sudan Medical Service, it is proposed, in the future, not to regard the laboratory as a detached organization, but to collaborate with the medical service, as a whole, in more extensive field operations. The first problem to receive attention along these lines will be malaria in the Gezira in relation to which an entomological survey has already commenced.

ROUTINE ACTIVITIES

These may be divided into (*a*) routine examinations of specimens and (*b*) preparation of vaccines. Routine specimens are sent in from all parts of the Sudan, but as might be expected a considerable proportion of such come from the Khartoum-Omdurman thickly-populated area. A recent feature is the large and steady increase in specimens sent in from provincial hospitals and dispensaries, while the total examinations have doubled within the last five years. There is sometimes a certain tendency to lay undue emphasis on an increase of routine examinations in evaluating the efficiency of a tropical research laboratory. Such increases are no doubt very gratifying but there seems a certain risk in allowing them to choke the essential research activities of such a laboratory.

In a country like the Sudan the fundamental importance of short range research demands a close liaison between it and routine examinations, the latter forming its raw material but at the same time it is equally important to hold a balance between them. The increase of routine work in the laboratory for the past five years has been an inevitable feature of the expansion of medical activities through the Sudan, but it is hoped, in the near future, by raising the standard of the small hospital laboratories throughout the country to decentralize considerably the volume of such work, in particular the simpler examinations of clinical pathology, and so leave the central laboratory more opportunities to deal with the important or difficult tests and the problems arising therefrom.

Another point in the work of a tropical laboratory which seems to have received insufficient attention is the statistical significance of negative results. It is perhaps not fully appreciated by home workers that the standard routine methods often give very misleading and fallacious results in tropical conditions, and hence an important element in routine research is the elaboration and the application of more accurate methods.

EDUCATIONAL

(a) *Improved training of Sudanese laboratory assistants for the hospital laboratory service.*—For some years past it has been the practice to send intelligent hospital orderlies to the laboratory for training in the simpler routine tests and after a period of tuition to send them out to the various provincial hospitals. Owing to the increasing demands for such assistants it was not always possible to give a sufficiently full course and frequently the candidates sent in were most unsuitable for laboratory work.

The present service of Sudanese laboratory assistants has been organized as follows: Every member of the existing service will undergo a full course of training for the Stack Laboratories, irrespective of the length of time he has already been in the medical service. The period of tuition proposed is at least four months. Their present educational standard is somewhat varied but all can read and write Arabic, a few have a good primary school education, and some have a certain knowledge of English. Tuition is carried out in Arabic by the British laboratory assistants under the superintendence of the assistant director of laboratory services and is entirely practical. The course is divided into two sections—(*i*) clinical pathology on which at least three months must be spent, special emphasis being laid on parasitological examinations of blood, fæces and urine, and the common bacteriological staining methods, *viz*, Gram's, Neisser's, Ziehl-Neelsen, etc., (*ii*) a practical course in the methods of dealing with infected materials; use of antiseptics, cleaning glassware, plugging tubes, making swabs and capillary pipettes, sealing ampoules, etc. This part is demonstrated by the head Sudanese laboratory attendant under the direct supervision of the senior British assistant. At the end of the course, a practical examination is held by the assistant director of laboratory services, and successful candidates recommended to the director, medical service, for promotion as classified officials.

To ensure the maintenance of this standard as far as possible, all Sudanese assistants will be brought back in due rotation for 'refresher' courses.

Hospital laboratories. The equipment is being standardized, all stains, reagents, etc., being the same as those used in the Stack Laboratories and issued in solution, as it has been found by experience that the local preparation of stains such as Leishman's is quite hopeless.

(b) *Teaching of medical students.*—The Stack Laboratories are in close association with the Kitchener School of Medicine and, in addition to courses in

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pathology, bacteriology, and parasitology given by the bacteriologists, a small pathological museum is maintained. Post-mortem demonstrations are also given, but, owing presumably to local prejudices, the number of autopsies is lamentably small and their rarity remains a weak feature in the education of the medical students. An attempt to lessen the difficulty is being made by increasing the number and variety of unmounted pathological specimens which can be handled by the students. It is not pretended that this is an efficient substitute for fresh post-mortem specimens. Furthermore, owing to the high temperature in Khartoum for a large part of the year, the preservation of mounted or unmounted specimens is a task of considerable difficulty and no really satisfactory method has yet been found for the preservation of colour.

Rabies research. Staining methods:—

It is doubtful if any of the usually recommended methods gives altogether satisfactory results with formalin-fixed brains.

The value of formalin however in a country like the Sudan lies in the ease with which a solution can be prepared, as it is supplied to all hospitals and dispensaries as an ordinary issue. Consequently, attention has been devoted to methods which will give the best histological differentiation with formalin-fixed brains. Trials are now being made with the Safranin-Fuchsin method of Lépine which is claimed to give excellent results for demonstrating Negri bodies.

Owing to the suggestive results of several recent workers that the mid-brain or medulla is more suitable for examination for Negri bodies than the usual hippocampus an investigation is now being made into this point on all brains received for routine examination.

Yellow fever.—Survey work was continued in two directions:—

(1) *Examination of livers.*—Routine instructions have been sent to all senior medical inspectors in the southern and western Sudan to send in specimens of liver from as many cases as possible of jaundice or fever of unknown origin dying within eight or nine days. Viscerotomes, as recommended by Dr. Soper of the Rockefeller Foundation, have been supplied to all important stations in the south and have proved of great value in obtaining specimens of liver from cases where a post-mortem examination was refused.

During the year 30 specimens of liver were received—29 of which were negative for yellow fever.

The following was the only suspicious case and serves well to illustrate the difficulty of diagnosis in a doubtful case from a viscerotome specimen of liver and the possible fallacies that may arise through the sole use of this method.

The history of the case was as follows:—

Patient was a male about 25 years of age who came direct to Malakal from Liri Nuba taking four days on the journey. He remained well for 16 days and then complained of severe epigastric pain and vomiting. Three days from the onset of symptoms he was admitted to hospital with intense jaundice and in a comatose condition. There was no fever while he was in hospital nor history of any before admission, nor did he vomit while in hospital. Spleen and liver not enlarged. Blood slide negative for malarial parasites but positive for *Filaria bancrofti*. Urine contained albumin (+ +), blood (+ +) and ova of *S. hæmatobium*. Cerebro-spinal fluid showed no abnormalities. After two and a half days in a comatose condition he died. An autopsy being refused, only a viscerotome specimen of liver was taken. Examination of this showed a widespread fatty degeneration of moderate degree and areas of eosinophil necrosis. These areas were not definitely mid-zonal. What appeared to be Councilman bodies were present and certain of the nuclei showed suggestive changes.

Owing to the suspicious changes in the liver, the slide was sent to Dr. G. M. Findlay, Wellcome Bureau of Scientific Research, London, for his opinion.

He reported as follows:—

'The liver slides which arrived yesterday were extraordinarily suggestive of yellow fever and had they come from a case in West Africa or one with a more suggestive clinical history, I should have had little hesitation in saying that they were from a case of yellow fever. If the history is correct and the man was only ill a short time, the intense jaundice is not characteristic of yellow fever. It usually only comes on in yellow fever cases about the eighth or ninth day. The absence of temperature is also peculiar, though it is difficult to imagine that such extensive necrosis could occur in the absence of all fever. There are quite a number of Councilman lesions in the liver and also, I think, intranuclear inclusions'.

Taking all factors into consideration it seems extremely doubtful if the case was one of yellow fever, in spite of the suggestive histological appearances.

(2) *Collection of sera for mouse-protection tests.*—The serum is pipetted off and sent in sealed ampoules to the laboratories where it is forwarded on to Dr. G. M. Findlay for the mouse-protection tests.

It might be mentioned that owing to strong recommendations Behring's venules were first tried but proved completely useless, the blood becoming rapidly hæmolyzed and arriving as a thick syrupy fluid useless for any serological test.

Serum from 29 cases was sent to London, of which nine showed protection; eight of the positive cases were from the southern Sudan, and one from Wad Medani. Investigation of the last showed that the patient was a cattleman from the western Sudan and the result therefore is of little significance.

Cases of jaundice of unknown ætiology.—During and previous to the yellow fever survey of the past two years numbers of cases of a clinical syndrome of unknown origin have been reported. The symptoms are usually moderate fever (in most cases), deep jaundice, vomiting in some cases, albuminuria is usually present but, in most cases, appears to be of slight degree. In some of the fatal cases leucocytosis (polymorphonuclear) is present, in one fatal case the white count shortly before death being 50,000 per c.mm., but this is unusual. A considerable number of such cases died but, as it is very difficult to obtain any reliable record of the total number, it is impossible at present to say if the mortality is high.

Pathology. All examinations of blood, urine and fæces have been negative. Mouse-protection tests have also given negative results. On several occasions it has been possible to investigate small outbreaks more fully and the possibility of leptospiral infections has been borne in mind but in no case have leptospirata been isolated, and adhesion tests, kindly carried out by Major H. C. Brown of the Wellcome Bureau of Scientific Research, have always been negative.

Pathological lesions. The microscopic appearances of the liver are very variable and often appear to bear no relation to the intensity of the jaundice and other symptoms. As a rule however there is well-marked necrosis, in some cases so extreme that all semblance to liver structure is lost. Hæmorrhagic changes are uncommon and infiltration of portal tracts and necrosed areas by lymphocytes is variable. Fatty changes are rare and there is no eosinophilic degeneration of the cytoplasm of affected liver cells. The spleen is usually greatly congested and, in some cases, there is a central necrosis of the Malpighian bodies. The kidneys are often congested and show changes in the convoluted tubules ranging from a cloudy swelling to a definite necrosis of the epithelium; the latter is, however, uncommon. Bile staining of the necrosed tubules may be present.

The resemblances, especially in the liver, between these cases and cases of an obscure infective disease associated with jaundice occurring in Nigeria have often been noted but until something more is known of the ætiology of the Sudan cases further speculation on this point is profitless.

Kala-azar.—Since the discovery by Forkner and Zia of the occurrence of Leishman-Donovan bodies in nasal and tonsillar swabs these are being examined as a routine diagnostic procedure. Positive results are

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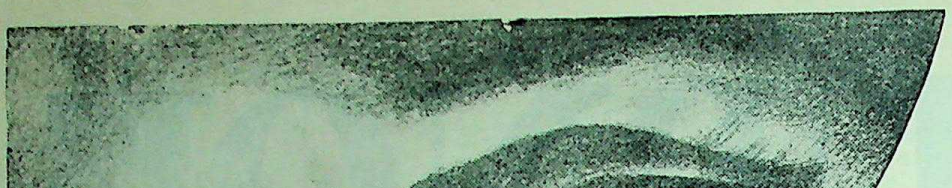
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frequently observed even in early cases where serological tests are negative but the value of the operation is at present *sub judice*.

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THIS is a collection of papers by practitioners in the colony, and it is also apparently the local organ of the British Medical Association as it includes a synopsis of the meetings of this body since the publication of the previous issue. The volume also contains fourteen papers which are mainly of clinical interest.

In a preparatory note the editors 'have again to apologize for the interval since the last publication'. Reference to our back numbers shows that number twenty-five of this 'annual' covered the year 1932 and was reviewed by us in September 1933. If the more regular appearance of this booklet cannot be assured those responsible for its appearance would be well advised to alter its title.

REPORT ON THE PUBLIC HEALTH ADMINISTRATION OF BURMA FOR THE YEAR 1935 INCLUDING ADMINISTRATION OF VACCINATION IN 1935-36

Cholera 0.57.—The death rate from cholera this year is the highest since 1930; it is 0.50 over the previous year and 0.51 in excess of the five-year mean. The year opened inauspiciously, for by the 1st January this disease was present in severe epidemic form in the Irrawaddy division. Early in January, it appeared in Pegu and Tenasserim divisions. The epidemic in Pegu division was limited in extent but that in Tenasserim assumed grave proportions. By May every division in the country was infected in varying degrees. The seasonal prevalence of the outbreak was most unusual for Burma. Whereas in previous years a cholera epidemic was usually limited to the months of April to July, the epidemic of 1935 increased in intensity between January and April, declined somewhat in May and June and increased again in July and August. After that it declined steadily towards the end of the year. The highest mortality was in the Tenasserim division, especially in Mergui district.

The disease was mainly prevalent in rural areas, and the difficulty of communications made the task of the public health staff a very formidable one. The cadre of epidemic sub-assistant surgeons employed for epimic duty was increased from 19 to 27 in January, and this strength was maintained for most of the year. From the reports of these sub-assistant surgeons, an idea can be gained of the hardships and obstacles which had to be overcome in reaching the far-flung areas to which the epidemic spread. The enthusiasm and keen sense of duty of the epidemic staff is reflected in the satisfactory total of 576,216 inoculations which they carried out. This is a record figure for Burma, the greatest number of inoculations in any previous year being 186,435. Regrettable though the necessity may have been for the inoculations, the response of the people to this modern method of protection is very encouraging, and is a striking example of the changing outlook of the populace towards the causes and prevention of this particular epidemic disease.

Anti-cholera measures.—Inoculation with anti-cholera vaccine and the purification of water supplies as far as practicable were the two main measures relied on. Intensive propaganda was carried out by the epidemic sub-assistant surgeons of this department and by the hygiene publicity officer. That fact combined with the intensity of the outbreak and the increasing recognition on the part of the people of the value of cholera inoculation, resulted in a record number of inoculations being performed. A close enquiry was made regarding any cholera deaths occurring amongst those who were inoculated. Figures have been collected from four districts relating to 241,713 inoculated individuals. As far as can be ascertained only 18 persons died of cholera amongst this inoculated population. Eight of these died within 72 hours of inoculation, *i.e.*, before immunity could be expected to be established. These figures are at present being subjected to a close scrutiny in co-operation with the statistical department of the Rangoon University, and it is hoped to publish them shortly, with conclusions drawn. The districts in which the largest number of cholera inoculations was carried out were Mergui 58,771, Pyapôn 56,682, Maubin 49,849 and Pakôkku 46,605.

As far as possible, the holding of *pwès* and festivals was restricted, but between the months of March and April this is a matter which presents some difficulty. Bleaching powder was used extensively in the purification of water supplies.

Smallpox 0.10.—The rate is 0.03 below the previous year and 0.02 below the five-year mean. Every district, except Kyaukpyu and Sandoway, reported mortality from this cause. As usual, the period March to May produced the greatest number of cases, and the lowest prevalence was in November. An analysis of the deaths by ages shows that 7.77 per cent of the deaths occurred among children under one year, 22.11 per cent among children between one year and under ten years and 70.13 per cent among people over ten years. The Vaccination Act which enforces primary vaccination in children who have attained the age of six months, has been in force in Burma since 1883 in the towns and since 1923 in the rural areas. The vast majority of the people get vaccinated as children and the value of primary vaccination is recognized generally. Until the necessity for revaccination is similarly appreciated, the annual mortality among people over ten years of age will be difficult to avert.

Plague 0.11.—It is satisfactory to record that this rate is the second lowest recorded in the province for this disease, since it first appeared in epidemic form in the year 1905. It is 0.08 below the previous year and 0.03 below the five-year mean. The improvement has been in the urban areas. As usual the sea-board districts of Arakan, Tavoy and Mergui were free. Other districts recording no mortality from plague were Hanthawaddy, Myaungmya, Thayetmyo, Pakôkku, Kyaukse and Lower Chindwin. November to March was as usual the period during which the disease was most prevalent, 1,013 deaths out of a total of 1,312 occurring in these months.

Anti-plague measures.—The use of cyanogas for the destruction of rats was introduced to the province in July 1934 and by the end of 1935 there were 49 towns and 20 districts in possession of the necessary apparatus together with a supply of cyanogas. A large number of the health staff in the municipal and rural areas had by that time been trained in the use of this poison Throughout the year this method of rat destruction was used extensively. Although it is impossible to ascertain the number of rats destroyed, the reports received state that there was a perceptible decrease in the rat population in the areas in which cyanogas was used. An improved type of cyanogas pump fitted with a cut-out device came on the market. With this pump the operator, after the requisite amount of cyanogas has been pumped into the rat burrow, is enabled to continue pumping air so as to ensure the effective distribution of the gas throughout the rat burrow system. This results in more effective use of the gas, and at the same time in an economy in the amount of cyanogas expended.

Fevers 7.31.—This figure is 0.47 below the previous year, but is 0.30 in excess of the five-year mean. Any decrease in this figure is most welcome, for this disease group accounts for 35.78 per cent of the total mortality in the province. The reduction of 0.47 per 1,000 corresponds to 5,741 less actual deaths. Mortality from this group of fevers is mainly reported from the rural areas where the village headmen are the registrars.

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The vast majority of cases with a rise in temperature are classified under this heading. In spite of this unsatisfactory diagnosis, there is no doubt that malaria causes a considerable portion of these deaths. The highest number of deaths from fever occurred in the month of December, and it is in that month that the highest incidence of malaria was also recorded. The lowest number of deaths was recorded in the month of February.

Enteric fever 0.22.—As the diagnosis of this disease is so often dependent on accurate bacteriological examination, it is believed that the total of 315 deaths recorded during the year falls short of the true mortality. Blood specimens for culture are taken by medical practitioners in only the minority of cases of fever, and for that reason many enteric infections are probably missed. Other factors against the detection of enteric cases are the remote chances of isolating the organism from the blood after the first week of the disease, and the fact that patients frequently wait for an appreciable time before calling in a medical man.

Dysentery and diarrhœa 0.53.—The provincial rate is 0.11 over the previous year and 0.06 higher than the five-year mean. Associated with the outbreak of the cholera epidemic, there was also an increase in the number of deaths reported from dysentery and diarrhœa. There was undoubtedly in the rural areas a certain amount of confusion regarding diagnosis, and it is probable that a certain number of the early cases of cholera was ascribed to this group of dysentery and diarrhœa. Some headmen are averse to diagnosing cholera on account of the alarm it may cause amongst the inhabitants, or perhaps, in some cases, on account of the extra work and trouble it may entail. The highest mortality from dysentery and diarrhœa was, as usual, recorded in the month of July and the lowest figures were recorded in February.

Respiratory diseases 0.99.—This is 0.08 lower than the previous year's figure and 0.01 below the five-year mean. The highest mortality occurred in December and the lowest figures were recorded in February. Each year there is marked preponderance of deaths amongst males, the proportion in 1935 to the deaths amongst females being 146 to 100.

Goitre.—The disease is reported from a number of districts mainly in the hilly areas such as the Shan villages in Thandaung township in Toungoo district, the Kachin Hill Tracts in Bhamo district and among the Hill Karens in Salween district. In the Southern Shan States it is reported from amongst the hill inhabitants of Kengtung subdivision. Treatment in the civil hospitals has been carried out extensively in some districts such as Myitkyina 1,726 cases, Northern Shan States 6,673 cases, and Mogôk and Thabeitkyin hospitals 564 cases.

Yaws.—This disease is very prevalent along the valley of the Tenasserim river in Tavoy and Mergui district. It is also prevalent in Victoria Point subdivision and Bokpyin township in Mergui district. No treatment was carried out in these areas during 1935 owing to lack of funds.

Leprosy.—Colonies for the housing, feeding and treatment of lepers were maintained at Mônywa and Minbu during the year.

This department considers that in the establishment of leper colonies lies the most effective measure for the control of leprosy in Burma. A colony is much cheaper to establish and to maintain than an asylum. It has an advantage over clinics in that in the colony the treatment can be taken to the segregated lepers, instead of expecting the individual lepers to go for treatment to the nearest hospital clinic which is frequently some miles distant. Were sufficient colonies started throughout the province, they would exercise a marked effect in checking the spread of leprosy amongst the general population, and in addition they would exercise a marked effect on the control of pauper lepers. The class of leper who now leaves his village to go and beg in the towns would have a colony to go to where his housing and food would be assured, where the conditions of life would approximate to those of his village and where he would get regular treatment leading to cure or early arrest of his condition. He would be spared the experience of being regarded as an outcast and having to descend to the level of a pauper.

Snake-bite.—The mortality due to snake-bite has become a subject of public interest in the last couple of years, as evidenced by questions asked in the Legislative Council and articles on the subject in the newspapers. Up to 1935 the mortality figures from snake-bite were collected under the same heading as deaths due to wild-beasts. For 1935, snake-bite figures have been compiled separately and these show that 2,186 deaths occurred during the year from this cause. Only 76 deaths were in towns the balance of 2,110 being in the rural areas. The provincial death rate was 0.18 and the rural and urban death rates were 0.20 and 0.05 respectively. The Russell's viper is said to be the commonest cause of death.

The highest seasonal incidence was in the month of December. A pamphlet in Burmese containing advice on the prevention and treatment of snake-bite was issued in January 1936, from the Hygiene Publicity Bureau of this department, and its distribution, especially in rural areas, is being continued.

Conservancy.—During the year 90 bored-hole latrines were constructed at Einmè and 17 at Thayetkôn in Myaungmya district. The cost of these latrines was met by the district council. This is an example which might well be followed by the district councils in those areas where bored-hole latrines can be constructed. In Kyaiklat township in Pyapôn district a number of bored-hole latrines were made and are reported to be working satisfactorily. A few bored-hole latrines were constructed in some of the villages in Insein township for demonstration purposes.

Rural health unit, Hlègu.—This is the sixth year in which the unit has been in operation. As in the previous years the work undertaken included the collection and study of vital statistics, health education, vaccination, school medical inspection, maternity and child welfare work, control of acute communicable diseases, refuse and sewage disposal, improvement of water supplies and abatement of nuisances.

Registration of vital statistics has been markedly improved. The birth rate of 35.51 recorded during the year is the highest since the inception of the unit. The mean birth rate for the five years prior to the starting of the unit was 16.89 per thousand. In order to encourage birth registration a new and attractive design of birth registration certificate was introduced during the year. This has captured the villager's imagination and has acted as good propaganda for early birth registration. Improvement has also been brought about in death registration. The death rate during 1935 was 20.20. The five-year mean rate prior to the unit's inception was 12.72. The infant mortality rate of 124.84 for 1935 is the lowest since the inception of the unit. There were 14 maternal deaths giving a ratio of 6.01 per thousand registered births and 74 still-births giving a ratio of 3.17 per hundred live births. The vital index of the area was 175.79.

Of the acute communicable diseases, there was one case of cholera who recovered and seven cases of small-pox with one death. Primary and revaccinations were carried out among 4,950 persons during the year. By the end of the year 68 per cent of the population in Hlègu township were protected by either primary or revaccination. Of the less acute communicable diseases, there were 26 cases of chickenpox, four cases of measles and 60 cases of whooping cough. Lectures, health conferences, lantern talks, cinema shows and school health talks totalled 280 with an approximate total attendance of 11,795. There were 247 infant and maternal welfare clinics held at the two centres in Hlègu and Dabein with a total attendance of 1,771. The nurse carried out 3,682 home visits. The two mid-wives conducted 413 confinement cases and paid 1,651 prenatal and 1,564 postnatal visits.

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During the year there were 36 registered vernacular schools in the Health Unit area; of these 17 were provided with individual drinking watercups, cupracks and properly protected water receptacles. Ventilation in the schools was sufficient, but in the majority of the schools the light was found defective. Improvement was, however, noticed in six schools. Regular school medical inspection was made in 22 schools and 1,156 children were given a thorough physical examination. Among this number, 380 or 32.87 per cent were found free from physical defects.

The unit continued to assist in leprosy work in the township so far as time and personnel permitted.

The number of laboratory examinations carried out was 89. Oil of chenopodium was administered to 2,453 persons for the treatment of round worm infection, and of the 1,972 cases in which the results were known 96.7 per cent were relieved. *Gambusia affinis* were distributed to four tanks in three villages as an antimosquito measure, and 100 malarious patients received 1,883 cinchona febrifuge tablets.

Measures for the improvement of environmental sanitation were continued as in previous years. A total of 395 inspections was made of wells and tanks and suggestions were given for their improvement; seven wells and two tanks were provided with force pumps and 34 wells were chlorinated. Sanitary inspections of food establishments and commercial premises totalled 1,528. Anti-rat measures were carried out as a routine and 355 rat holes were fumigated with cyanogas, 490 holes blocked and 5,742 rats were trapped or poisoned. During the year 1,556 lorry loads of refuse were removed to the dumping grounds in Hlègu and Dabein.

The policy of encouraging the householder to construct bored-hole latrines was continued and during the year 201 additional bored-hole latrines were provided. In 20 per cent of these the householder contributed part of the cost. The total number of bored-hole latrines constructed by the unit up to the end of 1935 was 1,828 in 17 villages. Under the supervision of a public health inspector the construction of bored-hole latrines was carried out in four villages in Insein township for demonstration purposes, and a number of boring implements were kept on hand for loan or for sale to local bodies. The total cost of constructing a bored-hole latrine in Hlègu is Rs. 7-14 which includes a reinforced concrete squatting plate of the latest design; the householder provides the superstructure. From the experience in this township and from data collected over a period of six years, when used with reasonable care a bored-hole latrine will last for four years for a family of five to eight persons. The constant use of a well-fitting cover prevents all fly breeding; but where this precaution is neglected and fly breeding occurs, a half inch layer of old motor oil or crude oil effectively stops the nuisance.

In its capacity as a field training centre for practical training of public health personnel, the unit undertook during the year the training of one assistant district health officer, nine sub-assistant surgeons and three public health inspectors. Six students for the Government of Burma License in Hygiene, eight students of the health visitors training class and fifteen students of the medical college visited the unit to gain practical knowledge in dealing with public health problems. Since its inception the unit has undertaken the practical training of 171 public health personnel.

Cinchona febrifuge tablets.—As usual, these were manufactured in the Rangoon jail, from where they were distributed to district treasuries either for issue on payment or for free issue when authorized. During the year 3,826,980 tablets were sold by the treasuries, which is an increase of 455,400 tablets over the sales of 1934. However, the increase was not general and was mainly confined to the Southern Shan States. The average consumption of cinchona febrifuge per head of population rose from 0.87 grain in 1933 to 1.00 in 1934 and to 1.20 in the year under review.

Maternity work.—In 1935 there were 34 midwives employed by 11 voluntary child welfare societies, and they attended 6,095 confinements, while 186 midwives employed by municipalities and district councils attended 19,447 confinements. In the towns of Burma 30.21 per cent of the total births were attended by midwives employed by child welfare societies or local bodies, and the corresponding figure in rural areas was 2.73 per cent. A large number of midwives are engaged in private practice, but the figures of the cases attended by them are not available, nor are those of the cases attended by private medical practitioners.

After the close of the year the Rural Health Unit, Hlègu, started an experiment of employing midwives on a reduced pay, and permitting them to charge fees proportionate to the means of the patient. An official receipt is given for every fee that is charged. It is believed that the people do not resent paying a moderate charge. The giving of an official receipt by the Health Unit obviates any abuse. The Hlègu system is still at the experimental stage, but the reports are encouraging. If it is a success, it might be followed by the district councils in the province, as it will enable the local bodies to employ an appreciably increased number of midwives without increasing the expenditure.

Health education.—In recent years there has been a marked development in this form of health activity. In 1935, there was a further appreciable increase in the amount of lecturing work. An encouraging sign was the many demands received from local bodies, public institutions and voluntary welfare organizations for literature on health subjects, for the loan of the Red Cross Society's health exhibits and for the services of the hygiene publicity officer.

The post of the hygiene publicity officer was kept vacant owing to financial stringency, but sub-assistant surgeon U. Tha Saing continued to carry out very effective health propaganda work.

[These abstracts only give a brief outline of the many activities of this very live public health department and detailed study of this report would repay any provincial health officer.]

ADMINISTRATION REPORT OF THE MUNICIPAL COMMISSIONER FOR THE CITY OF BOMBAY FOR THE YEAR 1935-36. VOLUME II. ANNUAL REPORT OF THE EXECUTIVE HEALTH OFFICER FOR 1935

Review of the year.—The number of live births registered during the year was more by 5,139 than the number of deaths that took place in the city. This excess of births over deaths was equivalent to 4.4 per 1,000 population calculated on the census of 1931 and was recorded five times in succession. Before 1931 there was no such excess since 1866, the year in which birth records were instituted. The number of live births registered was 34,428, being 704 more than in 1934, 8,795 more than the average of the last ten years 1925 to 1934 and the highest on record since 1866. The birth rate calculated on the census population of 1931 was 29.6 births per 1,000.

The total number of deaths from all causes was 29,289, being 1,919 more than in 1934, 3,278 more than the average for the last five years (1930 to 1934) and 1,737 more than that for the preceding decennium (1925 to 1934). The death rate per 1,000 of census population of 1931 was 25.2 as against 23.6 in 1934 and 23.7 the rate recorded for the decennium 1925 to 1934.

There was only one death from plague during the year as against 31 in 1934 and 89 the average of the last ten years 1925 to 1934. Smallpox was in an epidemic form and caused 1,248 deaths as against 152 in 1934 and 846 the average for the last decennium 1925 to 1934. Cholera was registered as the cause of 13 deaths (including 8 imported) against the same number in 1934 and 17 less than the average for the ten years 1925 to 1934. Influenza was prevalent in a mild form in the city during the year and caused 72 deaths as against 98 in the preceding year and 86 the average

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for the last decennium 1925 to 1934. The deaths from diseases of the respiratory system numbered 10,642, being 586 more than in 1934 and 617 more than the average of the last ten years 1925 to 1934. Tuberculosis accounted for 1,929 deaths as against 1,856 in 1934 and 1,604 the average for the preceding decennium 1925 to 1934.

Ninety-seven deaths were due to malaria, being four less than in 1934 and 170 less than the average of the last decennium (1925 to 1934). There were 1,389 deaths from ague and remittent fever as against 1,397 in 1934. The average number of deaths for the last ten years (1925 to 1934) from malaria was 267 and from ague and remittent fever 1,569. The deaths among infants under one year of age numbered 8,455 against 8,253 in 1934 and 7,474 the average for the last ten years 1925 to 1934. The rate of infant deaths per 1,000 births registered was 245.6 as against 291.6 the mean of the preceding decennium.

Compared with the decennial averages (1925 to 1934) the total number of deaths shows an increase of 1,737, the principal increase in the mortality being 402 deaths under smallpox, 617 under respiratory diseases, 241 under diarrhœa and dysentery, 153 under measles, 325 under tuberculosis, 70 under cerebro-spinal fever and 54 under enteric. On the other hand there was a decrease in deaths under plague by 88, under influenza by 14, under ague and remittent fever by 180 and under malaria by 170.

Prevention of infantile mortality.—The work which is being done in Bombay for the reduction of infant mortality may be described under the following heads:—

(*i*) Visits by the municipal district nurses for the purpose of getting into touch with prospective mothers and for discovering cases of sickness especially among women and children and unvaccinated children; for enquiry into the condition of new born infants; and for giving instruction by homely talks as to the care and rearing of children.

(*ii*) Attendance on confinements.

(*iii*) Provision of necessaries and comforts during the lying-in period.

(*iv*) Maternity homes.

(*v*) Infant welfare centres and infant milk depots.

Municipal nurses.—The number of municipal nurses employed is ten, one being attached to each of the ten district registrars' offices. They visit daily the localities and the *chawls* inhabited by the poor and help to diffuse and popularize elementary knowledge of the principles of health and hygiene and to carry such knowledge into the homes and lives of the ignorant; they give advice on the prevention of disease and the care and up-bringing of infants and bring to the notice of the authorities unregistered births, unvaccinated children and cases of sickness; they also persuade prospective mothers to go to the maternity homes provided for them free. Where this provision is not taken advantage of, they attend on the women in their own houses providing them with bedding for the confinement, and with food in the shape of milk and bread during the first seven days of the puerperal period. The visits of the nurses are frequently the means of bringing to the municipal dispensaries sick persons who would otherwise either not know the existence of the facilities provided or knowing would, through indifference and apathy, neglect to benefit by them. These visits are doing much good and are welcomed and appreciated by those for whose benefit they are paid.

Infant welfare society.—This society has been doing good work. At the end of the year there were seven centres, three maternity homes and one crèche at DeLisle Road. Each centre is in charge of a lady doctor (full time), a graduate of the Bombay University, under whom there is a supervisor and a health visitor; the former is a fully qualified, diplomaed nurse and the latter is a qualified maternity nurse.

The supervisor looks to the distribution of milk and assists the lady doctor at the clinics and in advising mothers on infant management. The health visitor visits her district and persuades the expectant mothers to take advantage of the maternity home in the city and to bring their babies to infant welfare centres for milk and treatment.

The society provides through its centres and homes (*i*) advice and instruction to mothers as to infant management; (*ii*) treatment to infants for minor maladies; (*iii*) baths to infants; (*iv*) free distribution of milk to the deserving expectant mothers and infants, and at reduced rates to those who can afford to pay; and (*v*) confinements at the maternity homes.

REPORT OF THE DIRECTOR OF MEDICAL AND SANITARY SERVICES, HONG KONG, FOR THE YEAR 1935

GENERAL REMARKS

IN the absence of some general system of registration of sickness, the only sources of information available for gauging the state of the public health in this colony are the returns relating to deaths, the notifications of infectious diseases and the records of Government and Chinese hospitals. Judging from the death returns the health of the colony was not quite so good as that of the previous year. The crude death rate was 22.90 per mille as compared with 20.93 for 1934.

Respiratory diseases accounted for 41.62 per cent of the total deaths; the percentage for 1934 was 39.97. The principal diseases causing deaths were broncho-pneumonia, pulmonary tuberculosis, bronchitis, infantile diarrhœa and diarrhœa.

The overcrowded houses, the expectorating habits of the people, and poverty furnish sufficient explanation for the prevalence of respiratory troubles.

Malaria.—This disease which in the early days of the colony was the great cause of death and from which Hong Kong derived its reputation of unhealthiness has now practically disappeared from the populous centres of Victoria and Kowloon as the result of the destruction of the breeding places of the carriers through efficient drainage. There is still some malaria in the outskirts of the two towns and a considerable amount in the rural areas of both the island and mainland.

Investigations have proved that swamps, ponds and other collections of water in the open plains are more or less harmless and that the real danger lies within mosquito flight distance of the foot of the hills and of valleys where collections of spring water in pockets, pools, swamps and streams form the breeding places of *A. maculatus, A. minimus* and *A. jeyporiensis.*

Why it is so we do not know, but spring water which has not lost its sparkle does have an attraction for these three species. As a rule such water has a faint acid reaction due to dissolved carbonic acid gas. When it loses its CO_2 and becomes flat it ceases to attract.

For many years the chief vector in the colony and new territories was believed to be *A. maculatus. A. maculatus* is a carrier but is of far less importance in the spread of malaria than *A. minimus* and *A. jeyporiensis.*

It appears that species of mosquitoes, like races of men, can under different conditions of climate and surroundings develop differences in habits and tastes for food. *A. maculatus* in Malaya readily takes human blood and is a very potent agent in the spread of malaria. In Hong Kong, where it is very prevalent, it seems to prefer animals to humans and its importance as a vector of paludism is much less pronounced.

Here as in Malaya disturbances of the soil often result in the formation of small collections of water which for reasons unknown attract the malaria mosquito and in which they deposit their eggs. The breaking of the soil is not a direct cause of malaria but a predisposing factor in a chain of events which favour the spread of the disease.

Pulmonary tuberculosis.—This disease continues to rank second to broncho-pneumonia as the principal cause of death. It is probable that some of the cases of the latter were of tuberculous origin. There is need for more hospital or infirmary accommodation for

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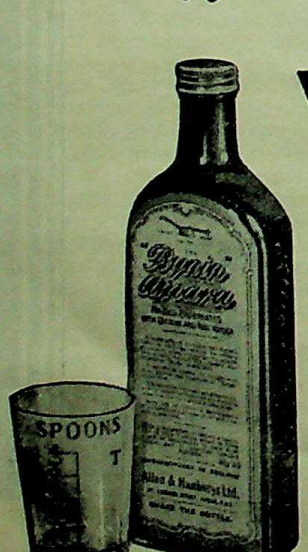
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tuberculosis patients, especially for those of the poorer classes.

Smallpox.—Every year in the cold season this disease manifests itself in outbreaks which are sometimes sporadic, sometimes epidemic. Whatever the prevalence there is always a tendency for the morbidity rate to decline or disappear with the advent of summer. In the year under review there were 61 cases and 44 deaths. Eighteen cases only were treated in hospital the remainder did not come under the notice of the authorities until after death.

The Chinese have a preference for vaccination in the spring as being the auspicious season, and for a month or two after Chinese New Year the Chinese public dispensaries are crowded with children waiting to be done.

The majority of Chinese still hold the opinion that the herbalist treatment of smallpox gives better results than the methods adopted by practitioners qualified in Western medicine. An analysis of the statistics of (*a*) the Tung Wah Infectious Diseases Hospital where only herbalist treatment is carried out and (*b*) the Government Infectious Diseases Hospital where Western treatment only is provided shows that this view is not correct. Calculating on the figures for the last 25 years the death rate at the Tung Wah was 47.2 per cent while that at the Government institution was 15.25 per cent.

Plague.—For the last six years no cases of plague have been reported in Hong Kong. The disappearance of this disease not only from the colony but from the greater part of China and its decline throughout the world are due to factors which are not understood.

Cerebro-spinal fever.—The disease is most prevalent in the cold weather. It dies down when the real summer heat sets in and people sleep more out of doors at night thus lessening overcrowding. Of the 110 cases reported, 54 or 49.09 per cent proved fatal. Ever since the severe outbreak of this disease, which occurred in 1917, a supply of serum, made at the Bacteriological Institute from the local strains of meningococcus, is kept in stock. This serum gives very good results when used early in the disease.

Enteric.—Cases of this disease are notified throughout the year, but there is usually some increase in the number reported during the summer months. The cases are usually sporadic and the source of infection is seldom discovered. Three hundred and nineteen cases were notified with 95 deaths as compared with 212 in 1934 with 65 deaths.

Leprosy.—Though leprosy is a notifiable disease very few cases are notified. The number of lepers in the colony is not known but assuming that the incidence rate is the same as that of the neighbouring countries the total number cannot be less than 500 and may approach 1,000. To many, these figures will appear to be exaggerations, nevertheless they are accepted by all who are authorities on the subject and have taken the trouble to make the necessary enquiries.

Rabies.—Ten cases of this disease were reported during the year. Three cases occurred in humans, the remainder in dogs. The human cases occurred in Kowloon. There were no cases on the Island of Hong Kong. Two of the human cases had been treated with anti-rabic vaccine before the appearance of the symptoms. All were fatal.

REVIEW OF THE REPORT ON THE WORKING OF HOSPITALS AND DISPENSARIES IN THE PUNJAB FOR THE YEAR 1935

THE financial position still remained such that there could be no expansion in medical relief during the year under report. The scheme for the provincialization of hospitals at district and *tahsil* headquarters remained at a standstill and the total number of medical institutions was practically unchanged. A new hospital was, however, constructed at Abohar and the Rai Bahadur Amar Nath Tuberculosis Institute was added to the Mayo Hospital, Lahore. The number of beds increased by 107, and there was some increase in the number of inpatients, but the total number of patients treated decreased from 14,024,499 to 13,858,928. The main reason for this decrease appears to be that malaria was less prevalent than in the preceding year owing to diminished rainfall. A heavy call on the medical resources of the province was made as a result of the Quetta earthquake, and the department rose to the occasion in a very creditable manner. A number of medical officers, nurses and dispensers were sent to Quetta and special accommodation for patients therefrom was provided in the principal hospitals of the province. The number of dispensaries decreased by two and the development of rural dispensaries remains stationary.

The expenditure of the department increased from 47 lakhs in 1934 to 49.88 lakhs in 1935, the increase being mainly accounted for by new buildings and the annual increments of the staff. As usual little income is raised from fees, but voluntary contributions amounted to Rs. 1,49,305. Government gratefully concur with the Inspector-General of Civil Hospitals in his acknowledgment of the generous gift of Rs. 1,00,000 by Rai Bahadur Seth Kishor Chand Maheshwari of Amritsar for the establishment of a maternity home at Amritsar. Another example of local enterprise is the construction of a tuberculosis sanatorium at Samli in the Murree Hills by contributions from private persons and local bodies under the ægis of the Red Cross Society.

The Mayo Hospital, Lahore, maintained its high reputation, and had to meet the brunt of the strain on the medical resources of the province due to the influx of patients from Quetta. The late Colonel T. A. Hughes, I.M.S., ably discharged the duties of Medical Superintendent of the hospital till he was appointed Principal of the King Edward Medical College in November, 1935. It was hoped that his rare gifts would have been of special value in the latter post, but continued ill health obliged him to take leave and his subsequent death in England was a great loss to the college and the province.

The civil hospital, Amritsar, continues to be handicapped by lack of accommodation, the daily average of inpatients being far in excess of the number which it was intended to provide. It is hoped to give relief by the conversion of the old medical school building into a separate ophthalmic hospital, and the plans for the necessary alterations are under the consideration of Government. The Ripon Hospital, Simla, also suffers from the same difficulty in spite of the number of beds being raised from 56 to 70 during the year under report. The Lady Willingdon Hospital, Lahore, continues to work at full pressure and many gynæcological cases had to be refused for want of accommodation. Proposals for providing accommodation for 116 more beds are under consideration. The construction of the Teka Devi Health Centre in connection with this hospital, made possible by the generosity of Rai Bahadur Lala Amar Nath, is also now in hand. All the above-mentioned hospitals, as well as the Punjab Dental Hospital, Lahore, and the Lady Aitchison Hospital, Lahore, maintained a high standard of efficiency.

As noted in the review for the previous year, the diagnosis and relief of leprosy is engaging the attention of the medical authorities to an increasing extent, and the survey conducted under the auspices of the Punjab Branch of the British Empire Leprosy Relief Association was continued. The working of the five leper homes in the province is reputed to be extremely satisfactory and a large number of the patients treated was cured or much improved. There are also 52 leper clinics in which 578 cases were treated. The question of applying the Indian Lepers Act to the province has again been raised, but Government consider it to be impracticable at present. It has been decided, however, to proceed with a scheme for establishing a settlement for 'burnt out' cases in the Lower Bari Doab colony, to which lepers from the leper homes can be transferred, thus making room in

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the homes for a greater number of active cases. The details of the scheme are under consideration.

The scheme inaugurated in 1926 for providing medical aid to women by lady doctors in separate hospitals at each district headquarters and in special female sections at each *tahsil* headquarters hospital still falls far short of achievement, but there are now 50 separate hospitals for women under the charge of lady doctors, and also 33 such doctors in charge of female sections in general hospitals. The number of beds for women increased from 3,971 in 1934 to 4,024 in 1935. At the same time there is a steady increase in the number of women doctors and the number of applicants for admission to the medical colleges and schools now exceeds the number of vacancies available. There are at present 216 women studying medicine in the various institutions, and during the year two women students qualified for the M.B., B.S. degree and 12 for the L.S.M.F. diploma. Satisfactory progress has also been made in the training of *dais* and midwives. A sum of 2 lakhs of rupees from Their Majesties' Silver Jubilee Fund has been set aside for providing a scholarship fund for the medical training of women.

THE SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH. ANNUAL REPORT FOR THE YEAR ENDED 31ST DECEMBER, 1935, JOHANNESBURG

Department of industrial hygiene.—The focus of interest in the matter of air-borne dust on the mines of the Witwatersrand has been influenced by the visit of Dr. W. R. Jones. It will be remembered that Dr. Jones had put forward an hypothesis to the effect that while most of the air-borne dust, and of the dust recovered from the lungs of those who have been exposed, was free silica as shown by chemical analysis, the majority of small particles was contributed by micaceous matter. It was also urged by him that it was the number of particles that was the dominant factor in injury to the lungs. The earliest analyses on dust recovered from lungs of sufferers from pneumonokoniosis were performed some eighty years ago, and these and subsequent analyses had shown that while most of the dust recovered was contributed by free silica, plenty of other dusts could be recovered, and nineteenth century workers accepted many dusts as pneumonokoniosis-producers. It was also held that while many dusts contributed to pneumonokoniosis, it was only certain dusts that were associated with tuberculo-pneumonokoniosis, and that it was this association with tuberculosis that was the significant factor in the disablement and death of those exposed. Early in the present century, E. L. Collis was thought to have proved by statistical analysis that it was free silica that was the tuberculosis-facilitating dust, and tuberculo-silicosis became also a synonym for dust-phthisis since, previous to the systematic examination of employees started on the Witwatersrand in 1916, it was only *via* tuberculosis that a phthisis-producing industry was identified.

Dr. Jones' hypothesis has raised certain questions. Firstly, was he correct in suspecting that it was micaceous matter that contributed to the majority of the smallest particles? Investigations have shown that, down to the minimal size identifiable by petrological methods, say a trifle below two microns, the majority of our air-borne particles, and of those recovered from lungs, are particles of free silica. This does not settle the question since 70 per cent of the particles by number both in air-borne dust and in dust recovered from lungs are of the order of one micron and less. To attack this problem it has been necessary to attempt a method of segregating dust in terms of size frequency.

Preliminary work by the Geological Survey and the Mine Air Committee is furnishing some support for Dr. Jones' view that the proportion of micaceous matter rises with diminution in size of particles.

This leads to a second question. It is fairly generally held that free silica is tuberculosis facilitating in virtue of the fact that it is slowly soluble in the lungs, and that this silica solute depresses the lungs ability to deal with after-coming infections. Is the micaceous matter met with in the air-borne dust on the Witwatersrand also soluble and, if so, is this solute toxic? Preliminary work on material supplied by the Geological Survey suggests that this solubility is negligible.

A third question arises. It is fairly well established that particles above three microns do not play an important part in phthisis production. It is not known what may be the minimal size at which inert (insoluble) particles cease to contribute to scar-formation. It is hardly practicable to collect a sufficient quantity of particles of one micron and below for inhalation or even for injection experiments, but one is contemplating subcutaneous and intravenous injections, also abscess-fixation experiments with a view to comparing the behaviour of free silica and micaceous particles of minute size. This is an important question: should these minute particles be free silica in considerable proportion then they should contribute to injuring the lungs owing to their solubility even if they do not contribute to scar-formation. On the other hand, should they be mostly micaceous and insoluble they may be of little importance. There is no higher incidence of simple tuberculosis among Witwatersrand miners than among the rest of the population of corresponding age-periods, which suggests that free silica dust only facilitates tuberculosis *via* preliminary scar-formation, *i.e.*, *via* a simple silicosis. One does not meet with either simple or infected silicosis in the absence of large numbers of particles, readily visible under ordinary magnifications, when examining sections of lungs unstained or after incineration on heat-resisting slides. (Magnifications of about 400 diameters.)

BIOCHEMICAL DEPARTMENT

As in the previous year, most of the work carried out has arisen from the native diet inquiry instituted by the Chamber of Mines.

Amongst numerous strange findings, mention may be made of a plant leaf belong to the yam family (*Dioscoreaceæ*) containing no less than forty times as much iron as spinach, whilst both the bulb and leaf of another specimen were found to be exceptionally rich in anti-scorbutic vitamin, the bulb being twice (*cf.* potato usually one-half or less) and the leaf no less than twenty-five times as rich in this substance as orange juice; however, the latter plant also possesses poisonous properties, and is only used as a food when these have been removed by special treatment.

A satisfactory feature of this study of native foodstuffs has been the encouragement and co-operation we have received from several anthropologists, who have emphasized the need for such information in connection with their own work.

Further experiments have been carried out on the composition of lucerne and its suitability for human consumption, and a report on some of the conclusions arrived at has been published. Several mines are now including the plant as part of their vegetable ration, and larger amounts have been tried out in certain mine hospitals where it has been possible to study the absorption of the antiscorbutic factor by the individuals consuming the lucerne. Dried preparations of the leaves have also been further investigated; one prepared commercially by a special process contained 1.6 mg. ascorbic acid per gramme, whilst another was as high as 3.5. The former meal has been tried out with promising results in two country native hospitals, where inexpensive antiscorbutics were practically unobtainable.

Merely from the nutritional point of view there can be no doubt that lucerne occupies a somewhat exceptional place, being remarkably rich in vitamins A and C, minerals and protein; however, either eaten raw or cooked as a spinach, it is apt to be somewhat fibrous unless obtained really young and fresh. Nevertheless, the plant is so hardy and so widely grown throughout the Union, that it may well be regarded as an emergency foodstuff of considerable value which will improve the

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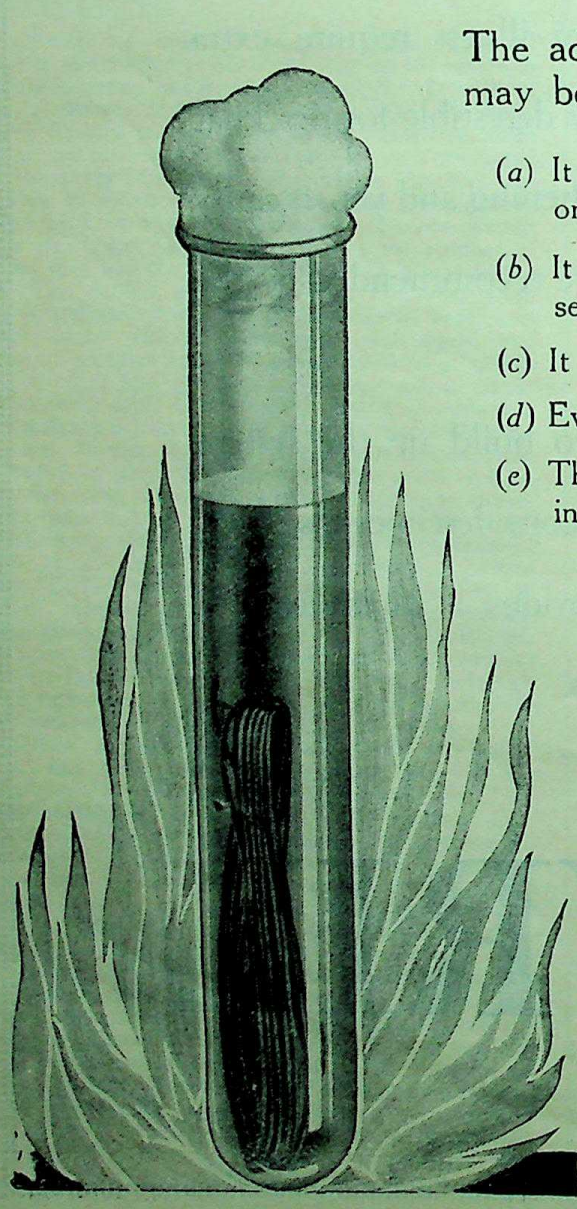
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(*a*) It possesses a good tensile strength both on the knot and in the suture as a whole.

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nutritional qualities of a ration at very low cost; moreover, the leaves, when specially dried, provide a highly concentrated source of the antiscorbutic vitamin which has the further advantage of being easily transported to areas where fresh fruit or vegetables are temporarily unobtainable.

Winter malaria.—A great deal of investigation has been carried out regarding the winter carriage of malaria in Natal.

The work included spleen surveys and the dissection of mosquitoes.

The results indicated a complete cessation of mosquito-borne malaria in winter in '*A. gambiæ*' areas, and that malaria is carried over from one season to another in the human host. It is suggested that the treatment of malaria in winter by the administration of quinine or other drugs would probably have a great effect on the incidence of the disease in such areas. Notwithstanding the above expression of opinion the possibilities of a low mosquito infection in winter in '*A. gambiæ*' areas along the coast cannot be dismissed entirely because of the higher humidity of the air enabling *A. gambiæ* to remain in habitations which is contrary to their behaviour in the more arid inland regions, and where the dryness of the air is such that although they may breed in winter they do not remain indoors.

With regard to *A. funestus* the results of investigation suggested a low, or no infection, rate among these mosquitoes in winter, plus a carry over in the human host; therefore both treatment of malaria and anti-mosquito measures are indicated.

Service Notes

APPOINTMENTS AND TRANSFERS

To be Officiating Deputy Director, Medical Services, Northern Command:—

Colonel W. H. Hamilton, C.I.E., C.B.E., D.S.O., K.H.P., *vice* Major-General A. W. M. Harvey, K.H.S., on combined leave. Dated 21st October, 1936.

Lieutenant-Colonel J. C. De, Superintendent, Campbell Medical School and Hospital, Calcutta, is appointed to act, until further orders, as Principal, Medical College, and Superintendent of the Medical College Hospitals, Calcutta, *vice* Lieutenant-Colonel T. C. Boyd.

Lieutenant-Colonel P. Banerji, on general duty at the Medical College Hospitals, Calcutta, is appointed to act, until further orders, as Superintendent, Campbell Medical School and Hospital, Calcutta, *vice* Lieutenant-Colonel J. C. De.

Lieutenant-Colonel J. Rodger, M.C., an Agency Surgeon, is appointed to officiate as Civil Surgeon, Sibi and Loralai, in addition to his own duties as Residency Surgeon and Chief Medical Officer in Baluchistan, with effect from the afternoon of the 7th October, 1936.

Lieutenant-Colonel P. F. Gow is confirmed in the post of Professor of Midwifery, Medical College, Calcutta, with effect from the 28th July, 1935.

In supersession of previous notification, the services of Major W. H. Crichton, Health Officer, Simla, are placed temporarily at the disposal of the Chief Commissioner, Delhi, for appointment as Assistant Director of Public Health, Delhi Province, Health Officer, New Delhi, and Health Officer, Notified Area Committee, Civil Lines, Delhi, on probation for 1 year, with effect from the afternoon of the 30th September, 1936.

Major S. Smyth is appointed to officiate as Civil Surgeon, Simla East, *vice* Lieutenant-Colonel B. Gale, granted leave.

The services of Major H. Williamson, O.B.E., an Agency Surgeon, are temporarily placed at the disposal of the Government of Bombay, with effect from the afternoon of the 7th October, 1936.

On reversion from foreign service under the Indian Research Fund Association, the services of Major R. C. Wats, an Officer of the Medical Research Department, are placed temporarily at the disposal of the Government of Bombay for appointment as Officiating Assistant Director, Haffkine Institute, Bombay, with effect from the date on which he relinquishes charge of his duties.

The Secretary of State for India in Council has appointed to the Civil Branch of the Indian Medical Service the following officers of the Indian Medical Service, with effect from the dates noted against their names:—

(1) Major W. Lawie. Dated 3rd July, 1935.
(2) Major R. L. Frost. Dated 26th July, 1935.
(3) Captain P. H. Cummins. Dated 13th October, 1935.
(4) Captain W. Scott. Dated 15th October, 1935.

In supersession of previous notification, Captain C. J. H. Brink is appointed temporarily as Air Port Health Officer, Karachi, on probation, with effect from the 23rd December, 1935.

In supersession of previous notification, the services of Captain J. P. J. Little are placed temporarily at the disposal of the Government of the Punjab, with effect from the 30th August, 1936.

Captain J. R. Dogra, Officiating Assistant Director, Haffkine Institute, Bombay, is placed on foreign service under the Indian Research Fund Association, with effect from the date on which he relinquishes charge of his duties.

Captain E. G. Montgomery, Civil Surgeon, Midnapore, is appointed as Civil Surgeon, Jalpaiguri, *vice* Captain H. A. Young, granted leave preparatory to retirement.

To be Lieutenants (on probation)

Stuart Cordingley Colbeck. Dated 1st September, 1936, with seniority 1st September, 1935.

John Herbertson Bowie. Dated 1st September, 1936, with seniority 1st September, 1935.

William Stewart Empey. Dated 1st September, 1936, with seniority 1st September, 1935.

Alastair Gowans Miller. Dated 1st September, 1936.

James Ford Thomson. Dated 1st September, 1936.

William Allen Hopkins. Dated 1st September, 1936.

Lieutenant E. H. Wallace is restored to the establishment. Dated 1st October, 1936.

LEAVE

Lieutenant-Colonel B. Gale, Civil Surgeon, Simla East, is granted leave up to the 21st March, 1937, with effect from the 3rd November, 1936, or subsequent date from which he may avail himself of it.

Lieutenant-Colonel M. Das, M.C., Superintendent, Alipore Central Jail, is allowed leave from the 2nd January, 1937, to the 16th January, 1937, both days inclusive.

PROMOTIONS

Major to be Lieutenant-Colonel

R. S. Aspinall, C.I.E. Dated 19th October, 1936.

Captain to be Major

A. N. Chopra. Dated 17th October, 1936.

Lieutenant (on probation) to be Captain (on probation)

C. W. A. Searle. Dated 26th June, 1936.

The seniority of Lieutenant A. G. Miller is antedated to the 1st September, 1935.

The seniority of Lieutenant J. F. Thomson is antedated to the 17th March, 1936.

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RETIREMENTS

Lieutenant-Colonel J. A. A. Kernahan. Dated 1st September, 1936.

Lieutenant-Colonel C. McIver, on account of ill health. Dated 2nd October, 1935.

Lieutenant-Colonel D. Coutts. Dated 1st September, 1936.

Notes

ANTIPHLOGISTINE

THIS is the time of year when pneumonia, influenza and other acute infectious fevers have their greatest incidence.

At the first sign of a 'chill', or if sore throat be present, the application of Antiphlogistine is one of the best safety-first measures.

Not only does it help to ameliorate the local conditions, but it may be the means of inhibiting the onset of more serious consequences. However, if pneumonia, bronchitis, or influenza supervene, Antiphlogistine helps to moderate the severity of the attack.

Antiphlogistine relieves congestion, eases pain and promotes comfort. The heat which it supplies over a period of many hours penetrates the tissues, encouraging the more rapid absorption of toxic products and the stimulation of a more active healing process.

It is especially valuable in the treatment of respiratory affections.

LONDON MEDICAL EXHIBITION

*New Hall, Royal Horticultural Society, Westminster, S.W.*1, 19*th to* 23*rd October,* 1936

THE Burroughs Wellcome and Co. exhibits again bore evidence on every side of the scientific resources of the firm and the continuous research work carried out. Amongst recent introductions, mention may be made of 'Stypven', Russell viper venom, described as the most efficient hæmostatic available; 'Ryzamin-B', which consists of the concentrated and purified vitamin-containing fraction of rice polishings, having a potency of not less than 50 International Units of vitamin B_1 per gramme; and 'Eulykol' phenylethyl esters of a selected fraction of the acids of hydnocarpus oil, introduced for the treatment of lupus vulgaris. The section devoted to insulin included a display illustrating stages in the manufacture of 'Wellcome' Insulin, which is made with crystalline insulin of 100 per cent purity. Ergot preparations occupied a prominent place, and were represented by Ergometrine, the recently-discovered water-soluble alkaloid, and Ergotoxine ethanesulphonate, which was originated and introduced by Burroughs Wellcome and Co. The pioneer work accomplished by the firm in connection with digitalis was exemplified by Digoxin, a pure, stable, crystallized glucoside, isolated from the leaves of *Digitalis lanata*. Preparations of *Digitalis purpurea* included 'Diginutin', a stable solution of the total glucosides of the leaf (physiologically standardized); 'Tabloid' digitalis leaf and 'Wellcome' tincture of digitalis. In addition to vitamin concentrates such as 'Ryzamin-B', 'Tabloid' carotene, 'Tabloid' ascorbic acid and 'Tabloid' calciferol, prominence was given to 'Kepler' cod liver oil with malt extract, which continues to meet the modern demand for a natural vitamin-containing product. A wide range of serological products was exhibited. These are prepared at the Wellcome Physiological Research Laboratories, Beckenham, Kent, and include 'Wellcome' concentrated diphtheria antitoxin-globulins; diphtheria prophylactics (four types are issued); 'Wellcome' concentrated streptococcus antitoxin (scarlatina) globulins; 'Wellcome' concentrated staphylococcus antitoxin globulins; 'Wellcome' staphylococcus toxoid for active immunization; 'Wellcome' anti-pneumococcus sera; and preparations for carrying out Dick and Schick testing. Specimens of the wide range of 'Tabloid' medicine chests and cases, and of 'Agla' hypodermic apparatus were an important feature of the exhibits.

COW AND GATE FEEDS ROYAL BABIES

THE following interesting intimation, addressed to Messrs. Cow and Gate Limited, has just been received



from the Private Secretary to His Majesty King Ghazi of Iraq, dated 24th September, 1936, from the Royal Palace, Diwan, Baghdad:—

'I have the honour to inform you that His Majesty, my Sovereign, has been graciously pleased to grant you the title of "Purveyors to the Royal Palace" in respect of your product Cow and Gate on which His Royal Highness the Crown Prince Faisal is being fed, in appreciation of the good quality of your said product. The respective Royal Warrant will be sent to you in due course.

RUSTAM HAIDAR,
Private Secretary to His Majesty.'

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Original Articles

RADIOLOGY OF THE HEART AND GREAT VESSELS

By J. A. SHORTEN, M.B., B.Ch., M.R.C.P. (Lond.), B.A.O. (R.U.I.)
LIEUTENANT-COLONEL, I.M.S. (Retd.)
Calcutta

Part I

THE NORMAL HEART

THE methods used in *x*-ray examination of the heart and great vessels of the thorax include fluoroscopy and radiography, measurement of the cardiac diameters, and special observations after a 'barium swallow'.

Owing to the divergence of the rays from the anode of the *x*-ray tube, there is much distortion of the image if the tube is close to the chest; so, to get an accurate representation of the size of the heart, films should be taken at a distance of six feet, or the actual size of the heart may be mapped out on the screen by cutting down the diaphragm to give an image of the heart border on the screen about the size of a postage stamp, thus using the central ray to delineate the outline of the heart shadow. Other procedures such as cinematography and kymographic analysis of the heart movements have not reached such a stage of perfection as to justify their general use. Similarly, stereoscopic films do not help.

METHODS IN USE

I. Fluoroscopy

Great importance is now attached to this procedure, especially by British radiologists, who place greater reliance on personal screen examinations than on any of the various systems of measurements.

The procedure to be adopted is as follows :— The patient is placed standing in the postero-anterior position behind the fluorescent screen. A rapid survey of the cardiac silhouette is made in inspiration and expiration; the movements of the diaphragm and the condition of the cardio-phrenic and costo-phrenic angles are noted. An experienced observer can tell at once whether the heart is enlarged or not. The presence or absence of aneurysm of the heart or aorta can usually be quickly determined. Any abnormal bulging or pulsation should be noted. A preliminary opinion can usually be given as to what cavities are enlarged and a provisional diagnosis made. The tone of the heart muscle, and whether it lifts well from the diaphragm, should next be observed.

The lung fields are then scanned for any abnormality, enlargement of the hili and opacities in the lung fields due to congestion are noted. Enlarged and pulsating branches of the pulmonary artery, indicating disease of the pulmonary arterial system, may be seen.

The patient is then slowly turned into the right oblique position (right side of the chest in contact with the back of the fluorescent screen) while a watch is kept on the borders of the heart and the great vessels. The movement should be continued until the retro-cardiac space assumes its maximal illumination on deep inspiration. This is the best position for examining the ascending aorta and left auricle. The left auricle occupies the upper two-thirds of the posterior border of the heart in this position and any enlargement backward should be noted. The posterior boundary of the retro-cardiac space is formed by the descending aorta. This is not usually seen on the screen; but aneurysm or calcification in its walls may make it visible.

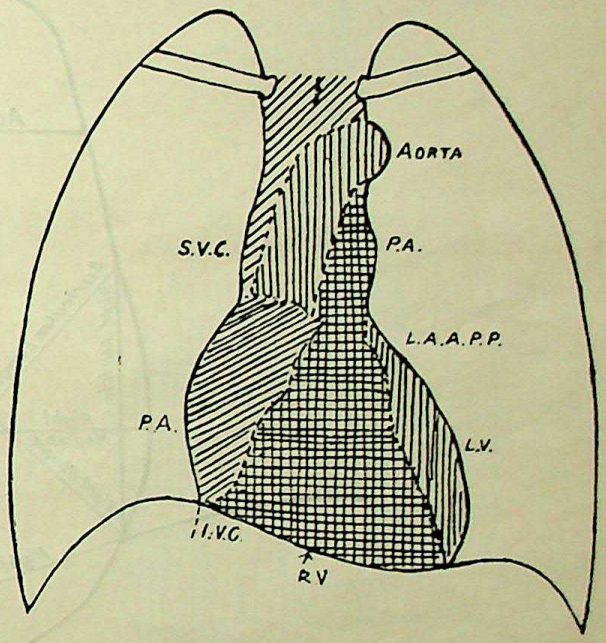


Fig. 1.—Antero-posterior view.

The ascending aorta, which here has the translucent trachea on one side and the lung on the other, now claims attention. Increase in its diameter, bulging or abnormal density should be noted.

The patient is now turned into the left oblique position (left side of chest in contact with the back of the fluorescent screen). In this the posterior border of the heart, composed of the left ventricle below and the left auricle above, is inclined to overlap the anterior border of the spinal column and the patient should be turned sufficiently to clear this on deep inspiration.

The arch of the aorta lies transversely just below the shadow of the clavicle with a triangular translucent space below, between it and the pulmonary artery, which can be faintly seen. Any increase in the diameter of the aorta or increased density should be noted. In

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this position the arch of the normal aorta forms a definite curve and a note should be made of any unfolding such as is seen in hyperpiesis. Also, as the anterior border of the heart here is formed of the right ventricle, a distinction can be made between enlargement of the right and left ventricle. The pulsations of the left ventricle should be carefully observed when infarction is suspected, as this condition may lead to immobilization of the affected part of the wall, or even an inward movement as the ventricle expands.

Finally, a look at the lateral view should be taken. The heart here lies at an oblique angle with the apex anteriorly, and the base above near the spine. There is a triangular space between the heart in front, the spine behind and the diaphragm below, and a similar clear space between the heart and sternum in front. The left auricle forms the posterior boundary of the heart shadow, while the anterior border is composed of the superimposed shadows of the ventricle below and the base of the aorta above.

The patient is now turned into the right oblique position and given an ounce or so of thick barium emulsion to swallow. As it passes down, its course, outlining the œsophagus, is observed. Normally, there is a little delay on reaching the aortic arch and there is a slight indentation corresponding to this structure, just below there is another indentation due to the pulmonary artery. From here the barium shadow passes straight down to the level of the diaphragm. When there is enlargement of the aortic arch or pulmonary artery these indentations are greatly increased. Enlargement of the left auricle may result in a large backward displacement of the œsophagus below the indentations due to the aorta and pulmonary artery.

To make a permanent record the screening set must have a tube that can be moved independently of the screen. The diaphragm is cut down to give a small central ray which is worked round the outline of the heart while the observer traces the silhouette with a grease pencil. This image can then be transferred to tracing paper.

II. Orthodiagraphy

If the special apparatus is available an orthodiagram may be made in a similar manner.

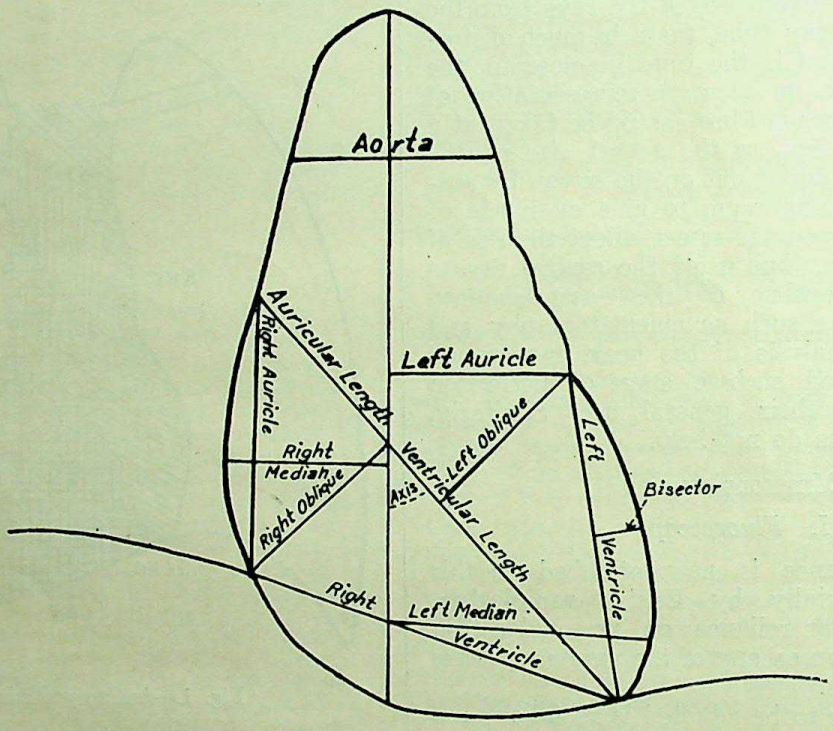


Fig. 2.

Care must be taken to mark the outline in diastole and in the same phase of respiration. This constitutes the chief difficulty and introduces the personal factor.

III. Teleradiography

Teleradiograms at two meters give a sufficiently accurate representation of the heart shadow for all practical purposes, besides giving a permanent record and eliminating the dangers of prolonged screening.

For a complete examination, skiagrams should be taken in the four positions used in screening. It will be found convenient to take oblique pictures just on completing the screen observation of the 'barium swallow', in the right oblique position. The tube is moved back to

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the two meters' distance, the patient is given another mouthful of emulsion and a skiagram taken on swallowing, with the breath held in deep inspiration. The left oblique and lateral views are similarly dealt with. Finally, a postero-anterior skiagram is taken.

(1) *Postero-anterior view*

This is a standard position for a general view of the chest. In this position the left border of the cardio-vascular shadow is formed from above downwards by, (*a*) the aortic knuckle or knob, being the left border of the terminal part of the arch of the aorta; this curve is exaggerated in arterio-sclerosis, dilatation and aneurysm, (*b*) a less obvious curve due to the pulmonary artery; this is accentuated when pressure in the pulmonary artery is raised as in

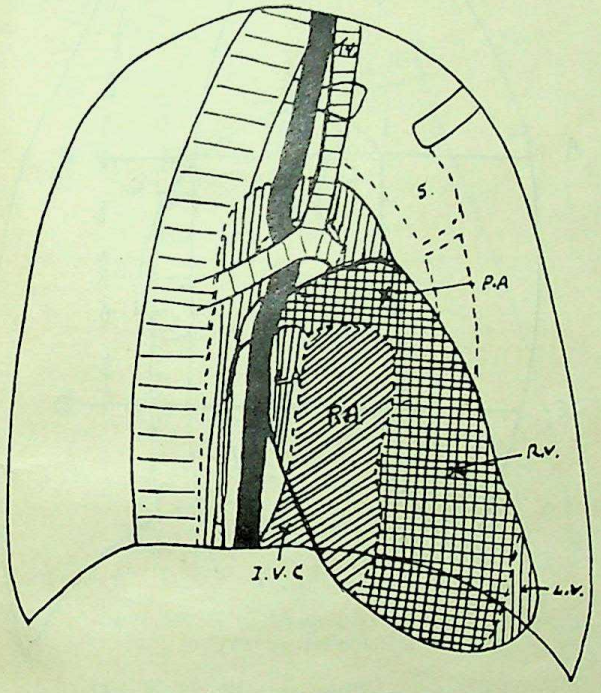


Fig. 3.—Right oblique.

mitral stenosis, patent ductus arteriosus and pulmonary stenosis; on the screen the enlargement will be seen to pulsate synchronously with the aorta, (*c*) the tip of the auricular appendix; this is not usually seen unless there is enlargement of the left auricle, as in mitral stenosis, (*d*) the left margin of the left ventricle continuing the heart border down to the diaphragm. The right border is formed by the right margin of the superior vena cava above and the right auricle below. In patients of the hyposthenic habitus the heart shadow is long, narrow and central, while in the hypersthenic subject the heart shadow is broader and shorter. The right ventricle forms most of the shadow as seen from the front.

Cardiac measurements are usually carried out on skiagrams taken in this position. Many schemes have been devised, but I will only describe the one used in my own practice. This is based on the work of Vaquez and Bordet. The two-meter skiagram is taken in full inspiration. The following lines are drawn on the heart shadow :—

(*i*) *Mid-line.*—A vertical line through the centre of the shadows of the spinous process.

(*ii*) *Transverse diameter.*—Perpendiculars to this from the point of greatest width of the heart shadow on the right and on the left. These give the right and the left median diameters, the sum of which is the transverse diameter of the heart. Normal: 14.5 to 9.5 cm.

(*iii*) *Length.*—A line from the point where the vascular shadow crosses the diaphragm, the usual situation of the apex, to the junction of the right auricle and the ascending aorta. This

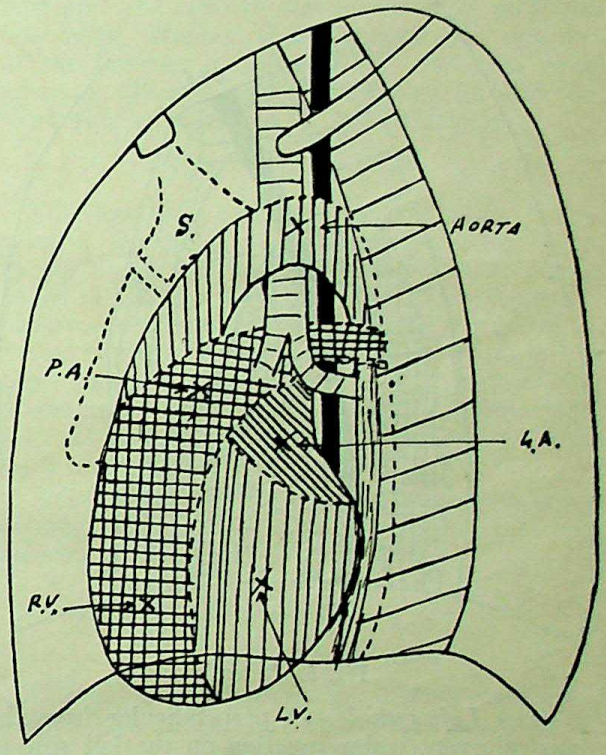


Fig. 4.—Left oblique.

determines the length of the heart. Normal: 15.0 to 11.5 cm. The angle formed by this line with the mid-line shows the degree of rotation of the heart on its vertical axis, the greater the angle the further out will be the apex, so that mere displacement may be distinguished from enlargement. Normal: 15.0 to 11.5 cm.

(*iv*) *Oblique diameter.*—Lines dropped perpendicularly to the length of the heart from the junction of the left auricle and ventricle (node of no motion), and from the cardio-hepatic angle form the right and left oblique diameters, the sum of which is the oblique diameter of the heart. Normal: 10.5 to 9.3 cm.

(*v*) *Index of auriculo-ventricular ratio.*—This is determined by bisecting the length of the heart by a line joining the cardio-hepatic angle

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on the right and the auriculo-ventricular junction on the left. The value of the upper segment (auricular) is divided by the value of the lower segment (ventricular) and the result for normal hearts is found to vary between 0.534 and 0.704. In ventricular preponderance this figure may fall to 0.200. In auricular preponderance, on the other hand, the figure may rise to 1.2.

(*vi*) *Left ventricle.*—A line joining the apex with the auriculo-ventricular junction on the left gives a measure of the size of the left ventricle. Normal: 8.5 to 6.7 cm. A perpendicular to this line at the point of maximum thickness establishes a bisector of its arc, and represents the thickness of the ventricular wall. Normal: 0.6 to 2.0 cm. The bisector is increased in ventricular hypertrophy.

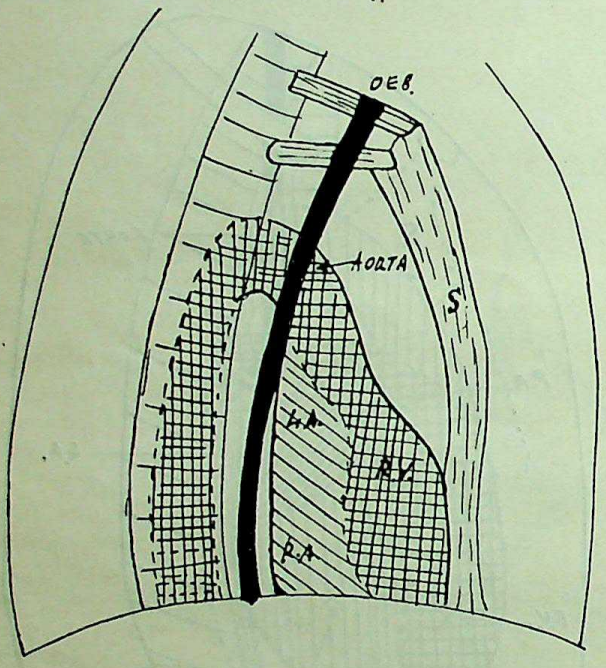


Fig. 5.—Lateral.

(*vii*) *Left auricle.*—A perpendicular from the auriculo-ventricular junction on the left side to the mid-line gives a measure of the left auricle. Normal: 5.0 to 3.5 cm.

(*viii*) *Right ventricle.*—A line joining the cardio-hepatic angle and apex measures the size of the right ventricle. Normal: 14.7 to 8.5 cm.

(*ix*) *Right auricle.*—A line joining the point of junction of the right auricle and vascular arc with the cardio-hepatic angle represents the size of the right auricle. Normal: 6.5 to 3.5 cm.

(*x*) *Aorta.*—This is usually measured by a transverse line drawn at the widest part of the arch usually at the level of the third intercostal cartilages. Care should be taken to exclude the superior vena cava on the right. Normal measurements are 3.9 to 5.7 cm.

These measurements help considerably in determining what chambers of the heart are responsible for a particular picture of cardiac enlargement.

In addition to the above measurements an estimation of the cardio-thoracic ratio is useful. By this we mean the ratio of the transverse diameter of the heart to the internal diameter of the chest. In people of normal build this should not be more than 1 : 2, hyposthenic individuals may have a ratio of 1 : 4, and in hypersthenic people the ratio may be as low as 1 : 1.9.

The transverse extent of the heart shadow of course varies with the phase of respiration; but most authorities are now in favour of measurements in full inspiration.

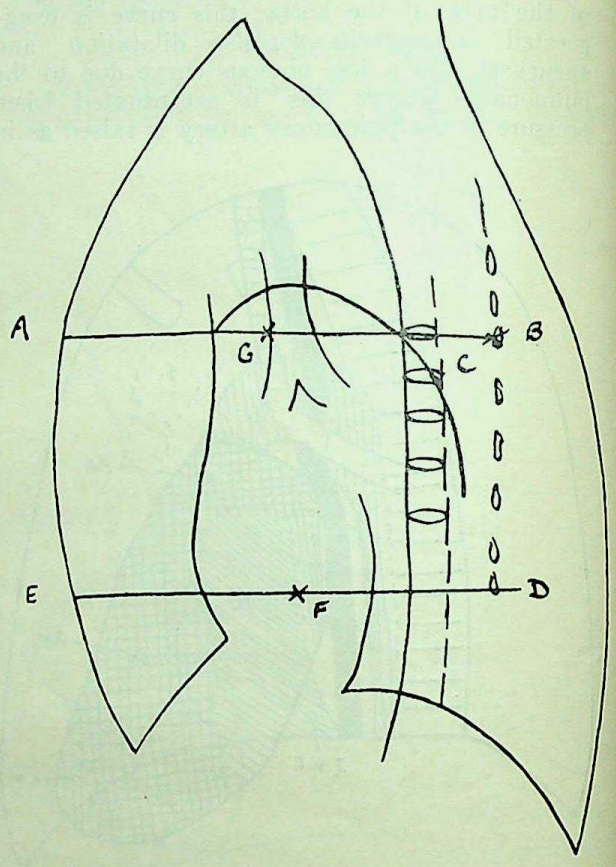


Fig. 6.—Left oblique—measurements.

The width of the aortic knuckle may be measured by giving the patient some barium emulsion to swallow, while a skiagram is taken in the antero-posterior position. A horizontal line drawn from the indentation, where the œsophagus crosses the arch, to the point of maximum convexity of the knuckle gives the width of the knuckle. This should not exceed 3.2 cm.

The ascending aorta can also be measured in the right oblique position where it is seen between the trachea and the lung. This measurement should not exceed 3.5 cm.

(2) *Right anterior oblique position*

This is the position for examining the ascending aorta and left auricle and their relations to the trachea and the œsophagus filled with barium.

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The left border of the heart shadow in this position is formed from above downwards by the arch of the aorta, pulmonary artery, right ventricle, and near the apex the left ventricle. The trachea lies in front of the arch, the left bronchus passes behind the ascending aorta and the right bronchus in front of the descending aorta. The barium-filled œsophagus passes in front of the arch and pulmonary artery, being indented by both.

The right border of the heart shadow is formed by the left auricle above and the inferior vena cava below. In the correct position, the right auricle does not enter into it. Behind the border lies the retro-cardiac space, bounded behind by the descending aorta which is not usually seen unless atheroma or aneurysm is present.

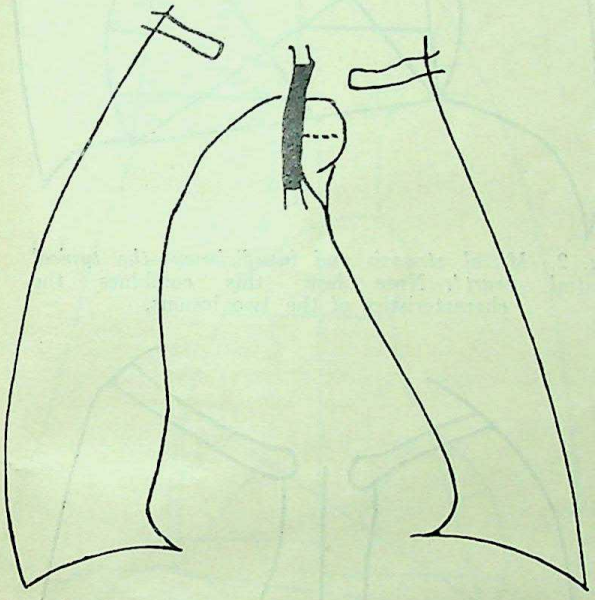


Fig. 7.—Inner border posterior part of arch outlined by barium in œsophagus.

(3) *Left anterior oblique position*

The heart and descending aorta now lie to the right of the spine and descending aorta, and therefore cross in front of the shadows of the trachea, œsophagus and right bronchus. The left bronchus passes in front of the descending aorta and pulmonary artery.

The arch of the aorta is seen passing transversely, and below this the pulmonary artery. The translucent trachea makes the latter transparent; it is not distinctly seen unless diseased. The posterior border of the heart is formed by the left auricle above and the left ventricle below. The anterior border comprises the ascending aorta above and the right ventricle below. With the patient at an angle of 45°, when the transverse diameter is at its minimum, the inter-ventricular septum will be midway between the front of the chest and the point where the ribs articulate with the spine. Also the transverse diameter of the normal heart at this angle is half the distance between the front of the chest and the posterior articulations of the ribs with the spine. If this ratio is less than 1 : 1.9 the heart is enlarged.

The position of the inter-ventricular septum can be fixed as follows : A mark is made on the anterior margin of the trachea at the level of the bifurcation. The distance of this from the anterior border of the chest is measured and laid off on the horizontal line through this point backward. The second mark should be just beyond the spine. A second horizontal line of equal length is drawn through the widest part of the shadow at the base. The mid point of this line marks the position of the inter-ventricular septum. Measurements to the anterior and posterior borders of the heart shadow will now give the relative size of the right and left ventricles. Neither should exceed one quarter of the internal diameter of the chest in this position. This is probably the best method for measuring enlargement of one ventricle.

(4) *Lateral view*

This has been described already under fluoroscopy; so attention need only be called here to the course of the barium-filled œsophagus, which describes a long curve with the convexity backwards following the course of the spine in its upper third, but coming forward in its lower third to reach the œsophageal opening of the diaphragm. There are no local indentations such as are seen in the postero-anterior and right oblique positions.

This view is most valuable for showing enlargement of the descending aorta and left auricle.

Part II

THE PATHOLOGICAL HEART

Dilatation and hypertrophy.—Both these conditions lead to enlargement of the heart as a whole, or of individual chambers. The following classification after Parkinson gives a general idea of the significance of enlargement of individual chambers, as well as general enlargement :—

(1) *Left ventricle*

(*a*) Aortic stenosis or incompetence.
(*b*) Hypertension.

(2) *Right ventricle*

(*a*) Mitral stenosis.
(*b*) Congenital malformations (Fallot's tetralogy).
(*c*) Chronic pulmonary diseases, and disease of the pulmonary artery.

(3) *Left auricle*

(*a*) Mitral stenosis.

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(4) *Right auricle*

(*a*) Mitral stenosis.
(*b*) Congenital malformations (patent auricular septum).
(*c*) Tricuspid stenosis.

(5) *Pulmonary artery*

(*a*) Mitral stenosis.
(*b*) Congenital diseases (patent ductus arteriosus).
(*c*) Chronic pulmonary diseases and disease of the pulmonary artery.
(*d*) Toxic goitre.

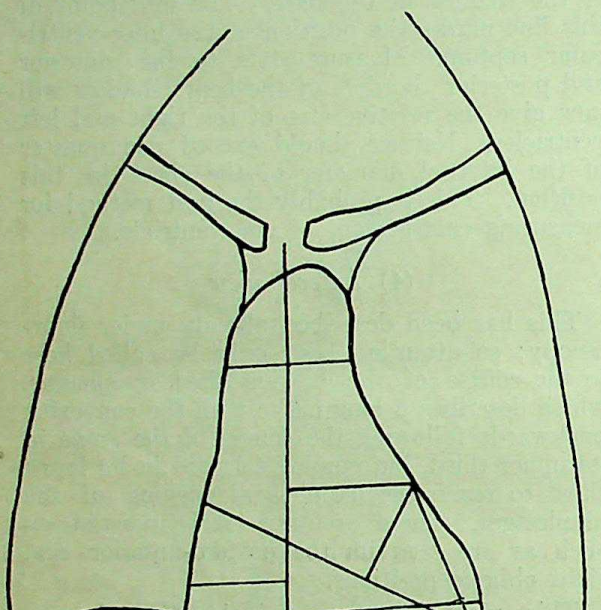


Fig. 1.—*Mitral insufficiency.* The left median diameter shows greatest change due to enlargement of the left ventricle and lateral displacement of the apex by an enlarged right ventricle. The low index of auriculo-ventricular ratio shows preponderant ventricular enlargement.

(6) *Aorta*

(*a*) Syphilitic aortitis—aneurysm.
(*b*) Atheroma.
(*c*) Hypertension.

(7) *General enlargement*

(*a*) Pericardial adhesions.
(*b*) Rheumatic disease.
(*c*) Aortic incompetence with mitral stenosis.
(*d*) Myocardial disease.

Having grasped the significance of the above it will now be convenient to discuss the radiological findings in the commoner diseases and abnormalities of the heart.

Valvular lesions

Mitral stenosis.—The 'back-pressure' theory, although not accepted by all, offers the most intelligible explanation of the clinical and pathological findings in this disease.

Narrowing of the mitral orifice causes increase of pressure in the left auricle which

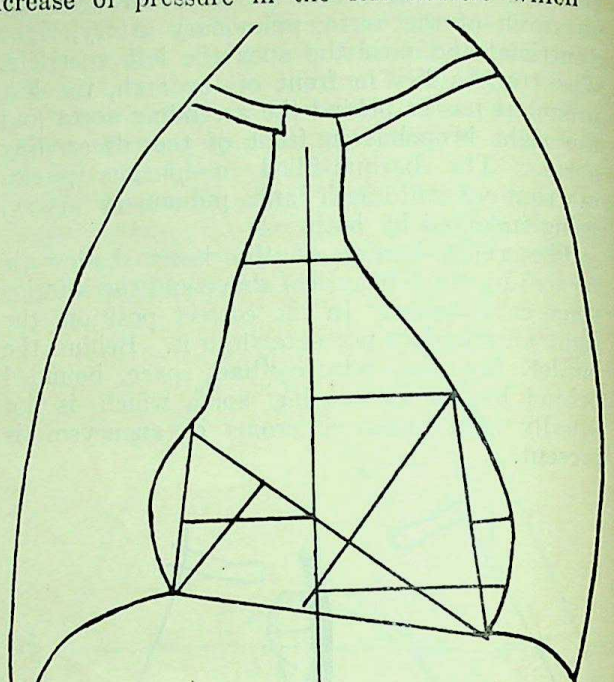


Fig. 2.—*Mitral stenosis and insufficiency—the typical 'mitral heart'.* Note how this combines the characteristics of the two lesions.

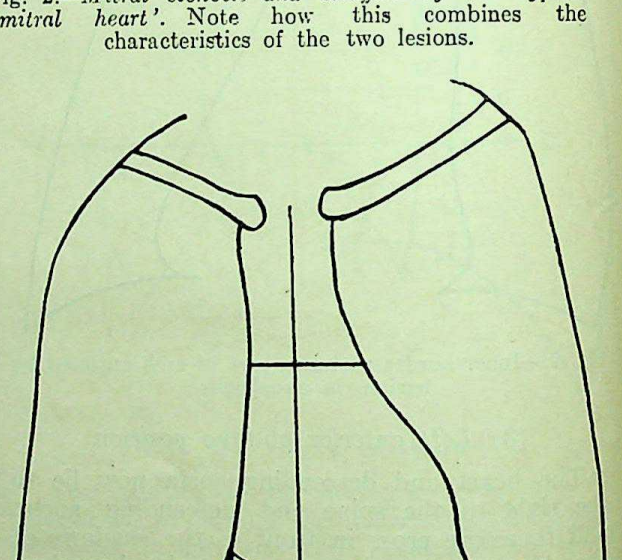


Fig. 3.—*Mitral stenosis with beginning insufficiency* (child aged twelve). Transverse diameter of heart 10.5 cm., pulmonary field 23 cm., showing uncertainty of the 'cardio-thoracic ratio' as a diagnostic criterion. Note the prominent auricles and high index of auriculo-ventricular ratio typical of mitral stenosis and the rounding and elevation of the apex due to insufficiency.

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dilates; the blood is then backed up through the pulmonary vessels to the lungs causing congestion (brown induration). This is communicated through the right ventricle to the right auricle, which having a thin wall also dilates. The left ventricle on the other hand, owing to a diminished supply of blood, actually shrinks.

The *x*-ray findings therefore are :—

Screen examination

(*a*) Enlargement of both auricles in the postero-anterior view; in extreme cases both the left auricle and the right auricle may be seen on the right border of the heart silhouette, and the enlarged pulmonary artery and conus of the right ventricle on the left border.

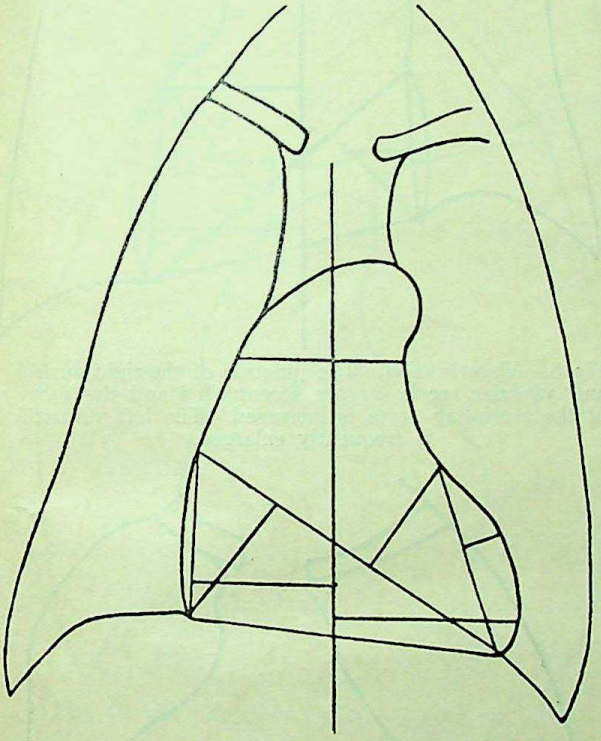


Fig. 4.—*Aortic stenosis.* Hypertrophy and dilatation of the left ventricle, with slow vigorous contractions of the heart and diminished aortic pulsations.

(*b*) In the right anterior oblique view with a 'barium swallow' the indentations caused by the enlarged pulmonary artery and left auricle are well seen.

Teleoroentgenogram.—One notes the prominence of the auricles—high auriculo-ventricular ratio (0.750 to 1,000)—rounding and elevation of the apex. For average measurements see table.

Mitral insufficiency.—The pathology here is due to an incompetent mitral valve allowing regurgitation of blood into the left auricle which dilates; a left ventricle which, owing to increased work, first hypertrophies and then as failure supervenes dilates. The resulting increased pulmonary resistance causes dilatation of the right ventricle.

The *x*-ray findings are :—

Screen examination

Postero-anterior view.—Enlargement of the left auricle and both the ventricles, and lateral

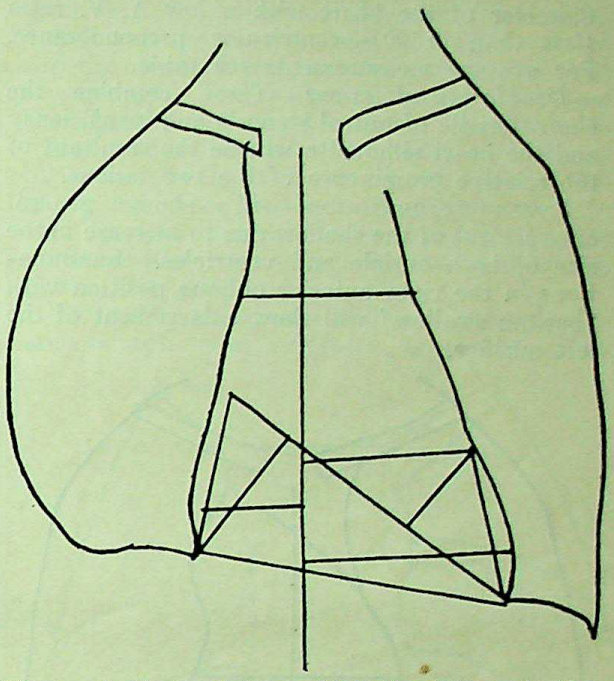


Fig. 5.—*Aortic insufficiency.* Note the increase in the length of the heart due to left ventricular enlargement. The heart shadow is centrally placed and the apex is lowered. The aortic width is increased. Pulsations of the heart and aorta are of increased amplitude.

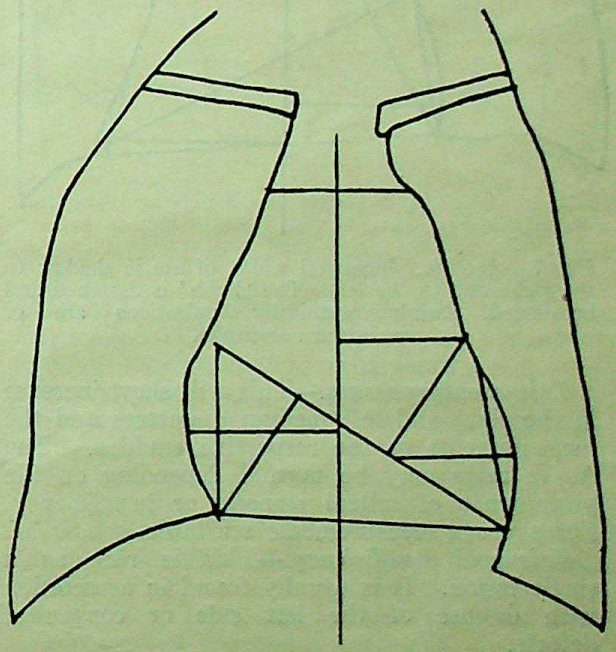


Fig. 6.—*Pulmonary stenosis.* Characterized by increased prominence of the shadow of the pulmonary artery and enlargement of the right side of the heart. Note that the left ventricle is not enlarged, but the apex is elevated by a hypertrophied right ventricle.

displacement of the apex by the enlarged right ventricle.

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Right anterior oblique view.—With a 'barium swallow' this shows backward displacement of the œsophagus due to the enlarged left auricle.

Teleoroentgenogram—shows increased values for the left auricle, ventricle and transverse diameter of the heart with a low A. V. ratio (less than 0.500)—ventricular preponderance. For average measurements see table.

Double mitral lesions.—These combine the characteristic of mitral stenosis and insufficiency and the heart silhouette will be the resultant of the relative prominence of the two lesions.

Screen examination—will show general enlargement of the shadow due to increase in the size of both auricle and ventricles. Examinations in the right anterior oblique position with 'barium swallow' will show enlargement of the left aurifice.

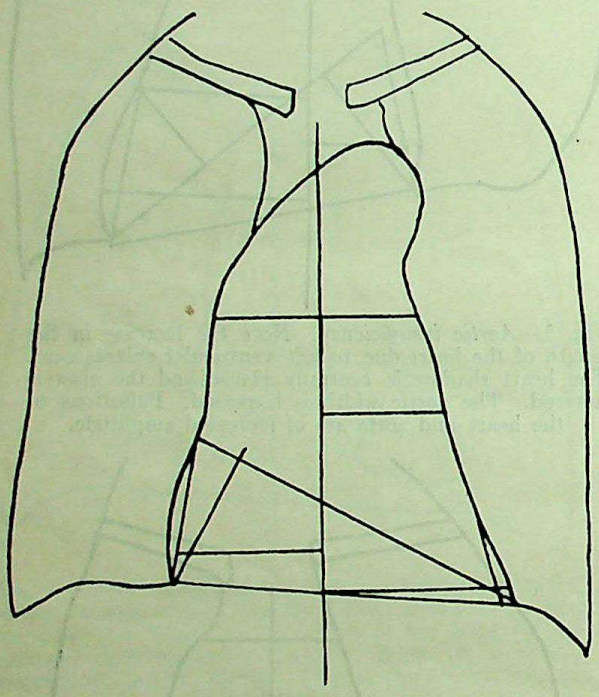


Fig. 7.—*Aortitis.* Increased width of aortic shadow to the right and to the left. The 'knob' is flattened and broadened. Roentgenoscopically pulsations are of increased amplitude.

Teleoroentgenogram.—This will show increase in the right and left median diameters and the measurements of the respective cavities. The A. V. ratio may be normal depending on the prominence of mitral stenosis or insufficiency. For average measurements see table.

Tricuspid insufficiency.—This is rare as a single lesion. It is usually found in association with disease of the left side or congenital defects.

The general size of the heart is increased and the measurements of the right auricle are particularly affected. The medium diameters are increased and the apex displaced to the left. The lung fields are congested and the right diaphragm is high, due to hepatic congestion. For average measurements see table.

Aortic insufficiency.—The characteristic signs in this condition are :—(1) Enlargement of the left ventricle and (2) increased width of the aorta. When the mitral orifice is stretched to a point which admits of mitral regurgitation the signs of mitral insufficiency are superimposed,

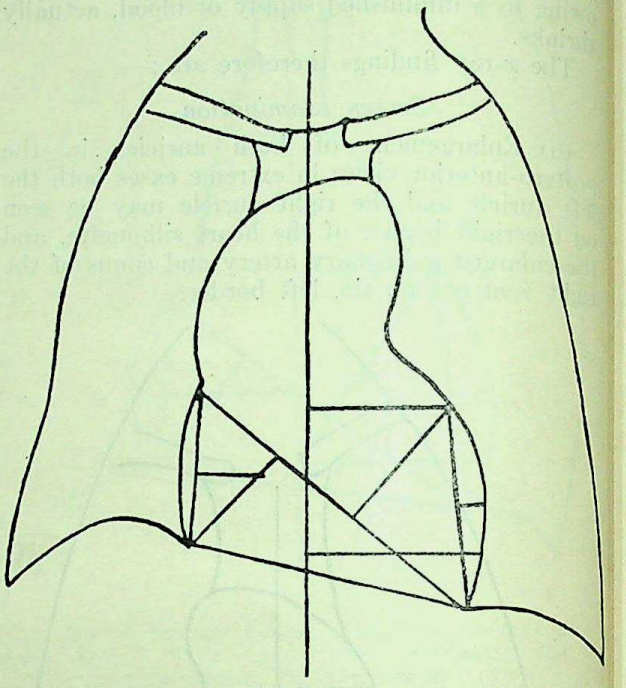


Fig. 8.—*Hypertension.* The junction of the right auricle and vascular arc is sharply accentuated and the curve of the ascending aorta is increased. The left ventricle is frequently enlarged.

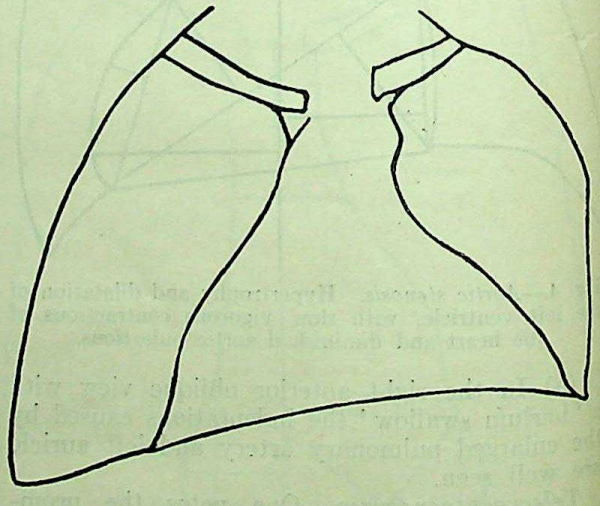


Fig. 9.—*Pericardial effusion.* For comparison with myxœdema. Roentgenoscopically cardiac pulsations are markedly diminished.

causing enlargement of the right heart, so that a progressive case shows general enlargement of the heart. For average measurements see table.

Aortic stenosis.—The characteristic change is enlargement of the left ventricle. The aorta is practically unchanged. The enlargement may be seen in the postero-anterior and left oblique views. The skiagram shows an increase in the

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left median diameter, left ventricular measurement and bisector. The length of the heart is increased and the A. V. ratio low. For average measurements see table.

Pulmonary stenosis.—This condition may be associated with a defect in the inter-ventricular septum or with a patent ductus arteriosus.

The signs are exaggerated prominence of the shadow of the right side of the heart. The left ventricle is not enlarged but its apex is lifted away from the diaphragm, fluoroscopically marked systolic pulsation of the pulmonary artery and the roots of the lungs are observed. For average measurements see table.

Aortitis.—The width of the aortic shadow is increased and it bulges to the right. The aortic knuckle is flattened and broadened.

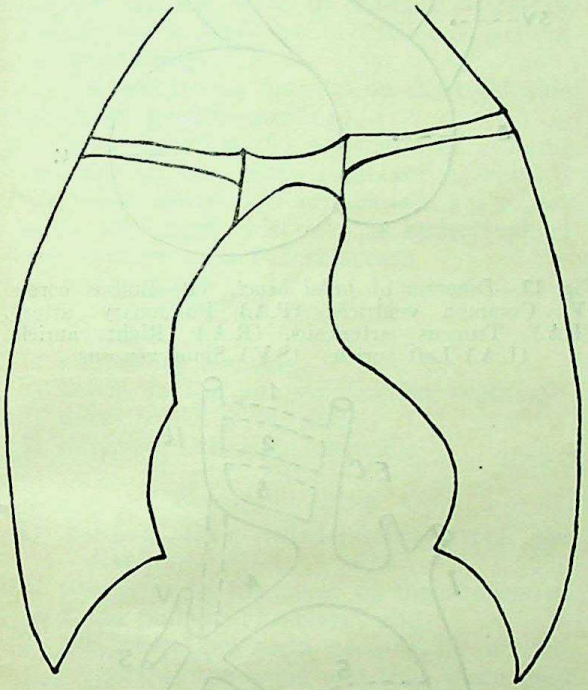


Fig. 10.—*Tetralogy of Fallot.* 'Coeur en Sabot'.

It is well to remember that increase in the diameter of the supracardiac shadows may be due to other causes than disease of the aorta, *e.g.*, enlarged thymus, lymphosarcoma, and even a dilated œsophagus filled with food in cardiospasm. Careful screening in different positions observing pulsation and the effects of a barium 'swallow' will prevent mistakes.

Aneurysm of the aorta.—The appearances due to aneurysm will vary with the size, site and shape of the pouching of the aortic wall. There may be general dilatation of the ascending or descending aorta, such as is usually seen in syphilitic aortitis. Sacculæ may develop anywhere along the course of the vessel, but are most frequently seen at that portion of the arch from which springs the innominate artery. Screen examination will show expansive pulsation of the walls, which distinguishes aneurysm from other tumours of the mediastinum.

The general appearance of the heart will depend on the presence and degree of aortic regurgitation.

Hypertension.—Fluoroscopy in the postero-anterior position reveals enlargement of the left ventricle. The junction between the right auricle and the vascular arch is sharply defined and the curve of the vascular arch to the right accentuated. The shadow of the aorta is denser than normal and can frequently be seen in its whole length through the cardiac shadow. If the shadow of the aorta can be seen through that of the left ventricle the aorta is diseased.

In the left oblique position 'unfolding' of the aortic arch is frequently seen and is often one of the first signs.

Two-meter skiagrams confirm the above. The arch is seen to be elongated, projecting to the

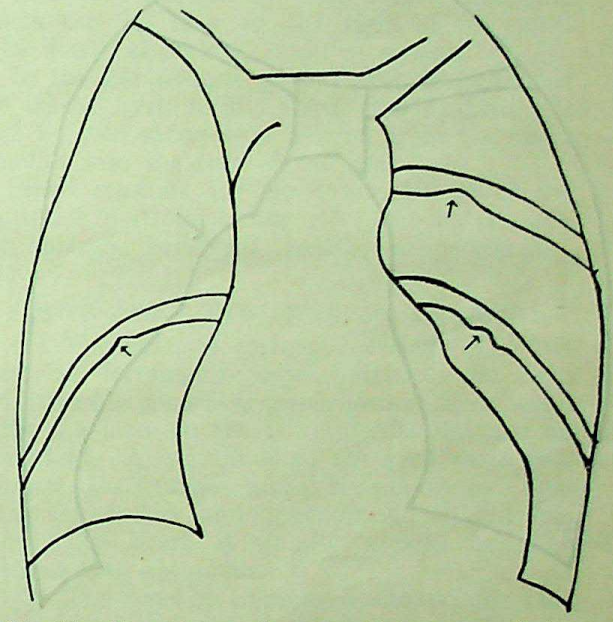


Fig. 11.—*Coarctation of aorta.* Note areas of focal erosion of ribs, enlarged left ventricle and small aortic knuckle.

right and rising higher than normal and sometimes reaching the first costal arch. The aortic knuckle may be unduly prominent.

A distinction should be made between,
(1) essential hypertension or hyperpiesia,
(2) hypertension with atheroma, and
(3) hypertension with renal changes.

In atheroma, the walls of the aorta being thickened, the shadow cast by this vessel is often denser than that of the left ventricle. Calcified plaques may be present around the rim of the knuckle, and in the descending aorta.

When renal changes are present, in addition to the characteristics of hypertension, gross hypertrophy and dilatation of both ventricles, more particularly the left, are found with evidence of valvular insufficiency. For average measurements see table.

Thyrotoxicosis.—The characteristic change is a straightening of the left border of the heart,

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which becomes concave on deep inspiration. This is best observed near the auriculo-ventricular junction.

Fluoroscopy shows increase in amplitude and rate of the cardiac pulsation.

Thyroid deficiency—myxœdema.—The outstanding feature is the enlargement of the heart. There is a general increase in all measurements, suggesting pericardial effusion. In the latter case, however, the lower limits of the cardiac silhouette are obscured, and there are alterations in contour with changes in the position of the patient. Contractions are almost imperceptible. In myxœdema the contractions are unaltered in amplitude, rate and rhythm.

Arhythmias.—Sinus arhythmia and extrasystoles—no alteration in size or contour.

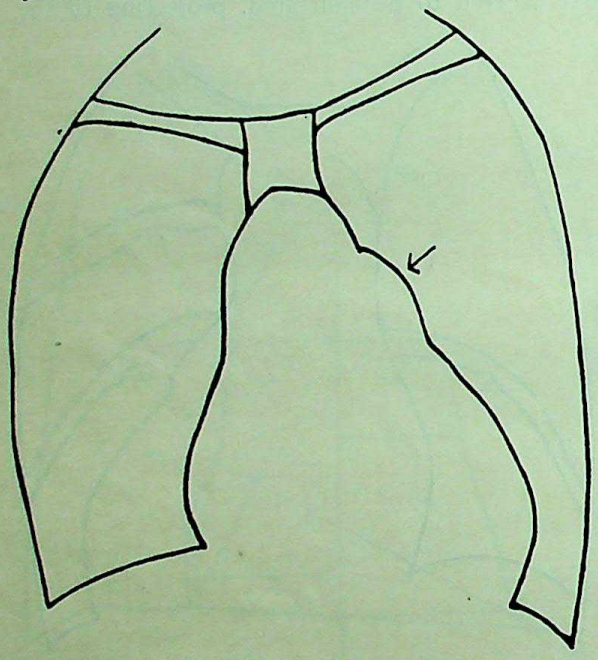


Fig. 12.—*Patent ductus arteriosus.* Note enlarged pulmonary artery.

Auricular fibrillation.—The amplitude of the contractions is diminished, especially in the auricles. The rhythm is irregular, and the rates vary.

Skiagrams show increased size of the auricles affecting the corresponding measurements.

Heart block.—There is a compensatory hypertrophy and dilatation of the left auricle causing increase in the left median diameter, left ventricular cavity and the bisector. The A. V. ratio is low.

Myocardial impairment.—In this all-important condition of the middle and old age, radiology can afford considerable help.

Fluoroscopically the amplitude of the contraction is much diminished. The left border of the heart is straight or concave. On turning the patient into left oblique position one may see a part of the contour of one of the ventricles, usually the left, which is immobile or moves in the opposite direction to the rest of the wall when the heart contracts or dilates. This, if clearly evident, means infarction of the wall.

The skiagram shows the straight or concave left border and small bisector. The median diameters lie close to the diaphragm.

Congenital lesions.—It is not my object to discuss the cause of these lesions but a couple

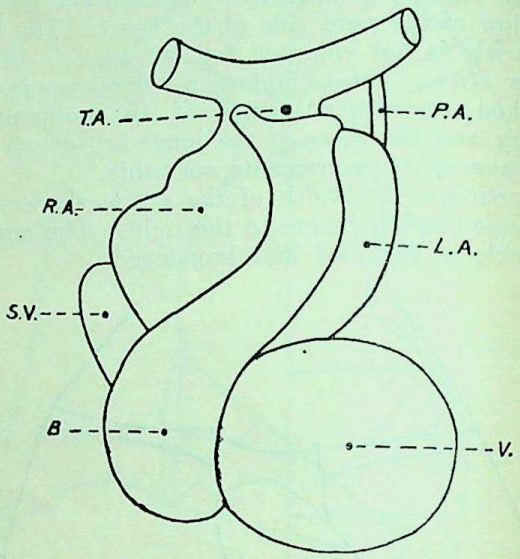


Fig. 13.—*Diagram of fœtal heart.* (B) Bulbus cordis. (V) Common ventricle. (P.A.) Pulmonary artery. (T.A.) Truncus arteriosus. (R.A.) Right auricle. (L.A.) Left auricle. (S.V.) Sinus venosus.

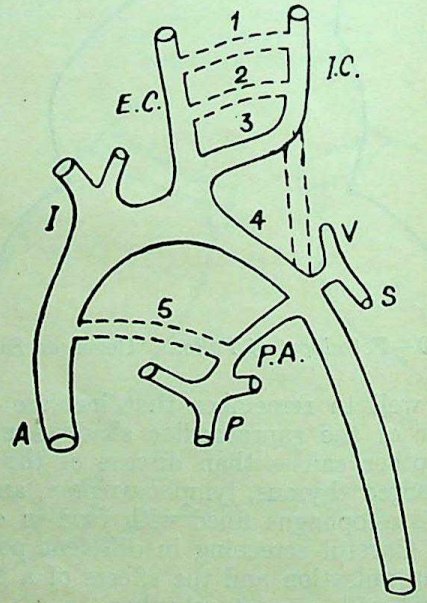


Fig. 14.—Development of left aortic arches: dotted lines indicate the vestigial arches. Numerals indicate the six arches.

of simple diagrams may help in their interpretation.

It is to be noted that in the course of development the ventricle is divided into two by the growth of the inter-ventricular septum starting from below. Similarly, the auricles are divided by the inter-auricular septum, though a communication, the foramen ovale, persists until birth.

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The bulbus cordis finally disappears.

Some of the more important congenital abnormalities are due to incomplete disappearance of the bulbus cordis or incomplete development of the ventricular or auricular septa.

The segment of the aorta between the origin of the left subclavian and the ductus arteriosus is called the isthmus and has little blood passing through it in the fœtus. It is consequently smaller in bore than the rest of the aorta.

Skiagrams in congenital lesions.—The changes observed concern the right side of the heart more than the left.

(1) The hypertrophied right ventricle lifts the apex away from the diaphragm (*coeur en sabot*).

(2) The conus of the right ventricle and pulmonary shadow may be absent (tetralogy of Fallot), or it may be accentuated (patent ductus arteriosus).

(3) The aorta may pass up on the right side of the spine (dextro-position).

(4) The aortic knuckle may be absent (coarctation of the aorta—right aortic arch).

Patent interventricular septum.—If the defect is large the right ventricle is hypertrophied causing a *coeur en sabot* skiagram.

Tetralogy of Fallot

This consists of :—

(1) pulmonary stenosis,
(2) defect in the inter-ventricular septum,
(3) dextroposed aorta, and
(4) hypertrophied right ventricle.

Skiagrams show

(1) cardiac apex lifted away from the diaphragm,
(2) concavity in the place of the shadow of the pulmonary artery, and
(3) the ascending aorta passing up on the right of the spine and thus there may be a right-sided arch.

Pulmonary stenosis with patent foramen ovale

(1) Right ventricle hypertrophied, and
(2) shadow of conus prominent.

If the foramen ovale is closed the right ventricle is greatly hypertrophied, the right auricle dilated and the shadow of the superior vena cava is prominent.

Inter-auricular septal defects

Patent foramen ovale.—The aortic knuckle is small or absent and the pulmonary shadow is enlarged.

Defects at the lower portion of the septum.—Anterior segment of mitral valve usually involved, therefore mitral incompetence or stenosis. *Coeur en sabot* may result. The hilum shadows are wide and dense and pulsate freely.

Patent ductus arteriosus.—The blood flows from the aorta to the pulmonary artery which is dilated or even aneurysm may develop.

The dilated pulmonary artery and enlarged right ventricle can be seen on screening.

Coarctation of aorta.—The dilated ascending aorta can be seen to the right of the spine. The aortic knuckle is small or absent.

In the left oblique position the aorta cannot be traced back to the spine, and its branches can be seen rising as a column from the heart shadow into the root of the neck.

Small erosions of the lower border of the posterior portions of the ribs, due to pressure by enlarged collateral vessels, are pathognomonic.

Dextrocardia.—Two forms are recognized.

(1) The heart is entirely reversed. The left ventricle forming the apex points to the right and there is general transposition of the viscera with the liver on the left and the stomach on the right. A barium meal in such cases emphasizes the changes, and it is important to note that the cæcum and appendix lie on the left side. The heart is usually normal and the patient does not suffer.

(2) The heart is transposed, the venous ventricle forms the apex and lies on the right side. There is no transposition of the abdominal viscera. There are usually other abnormalities as well, such as patent ventricular septum.

[In writing this paper, the author acknowledges the help he obtained from *Recent Advances in Cardiology* by East and Bain, and from the October 1932 number of the *American Journal of Roentgenology*.]

Average heart measurements in different conditions, in cubic centimetres

	Normal range	Mitral stenosis	Mitral insufficiency	Double mitral lesions	Tricuspid insufficiency	Aortic insufficiency	Aortic stenosis	Pulmonary stenosis	Hypertension
Length ..	15.0 to 11.5	15.6	16.8	21.0	22.0	20.0	17.5	16.0	17.0
Transverse ..	14.5 to 9.5	15.4	16.0	21.0	23.0	19.6	16.8	15.5	15.5
Oblique ..	10.5 to 9.3	13.7	12.5	17.0	16.0	15.5	12.8	14.0	12.5
Left ventricle ..	8.5 to 6.7	7.0	9.2	9.5	12.1	13.2	10.8	8.5	10.0
Bisector ..	0.6 to 2.0	1.0	1.7	2.0	2.2	3.5	3.5	2.0	2.5
Right ventricle ..	14.7 to 8.5	14.5	15.3	18.9	21.7	19.0	16.0	16.0	15.5
Left auricle ..	5.0 to 3.5	7.5	7.0	8.2	8.9	7.0	7.8	6.0	6.5
Right auricle ..	6.5 to 3.5	8.0	7.7	11.5	9.4	8.0	8.0	8.0	7.5
A. V. ratio ..	0.534 to 0.704	1.000	0.600	0.800	0.527	0.500	0.500	0.704	0.650

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EXPERIENCE WITH RUSSELL'S VIPER VENOM

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Case 1.—The operation of tonsillectomy was performed on a male aged 48, Anglo-Indian, for the removal of grossly infected tonsils. This patient had warned the writer beforehand that he was, what he termed, a 'bleeder', and in consequence his coagulation time had been estimated and was found to be 6 minutes. In view of this increased figure, previous medication by calcium had been undertaken and prophylactic hæmoplastin had been administered.

In spite of these precautions the patient bled freely from the tonsillar site, the blood being notably fluid and with little tendency to clot. The hæmorrhage was of the general oozing type, there being no particular bleeding point. Since neither continued pressure nor suture of the pillars succeeded in stopping this bleeding, small pledgets of sterile cotton-wool were soaked in 1 in 10,000 solution of Russell's viper venom and these were swabbed over the tonsillar site. The effect was immediate and dramatic. The bleeding stopped forthwith, and the pillars of the fauces were sutured without trouble over a dry tonsillar bed. Beyond one vomit of blood which had obviously been swallowed, no further hæmorrhage took place.

Case 2.—Female, aged 36, Anglo-Indian. This patient had had 17 children and was reported to have bled after all her confinements. The last five of her confinements had taken place in the Lady Curzon Hospital, Bangalore, and on each occasion the patient had had postpartum hæmorrhage with or without retention of the placenta. After the 17th confinement, sterilization was recommended; but the husband of the patient was at that time unwilling. Subsequent to her discharge from hospital, she had, however, suffered from menorrhagia with severe floodings and passage of clots and for this complaint she again sought advice.

On examination, the uterus was found to be enlarged and the hæmorrhage was considered to be metropathic in origin; and hysterectomy was recommended.

On the 14th November, 1936, under spinal percain anæsthesia, a total hysterectomy was performed without any undue operative difficulty, and the patient returned to the ward in good condition. Five hours later, the writer was sent for by the house surgeon urgently on account of copious hæmorrhage. On arrival he found the patient collapsed with a pulse of 160 and barely perceptible, respirations were sighing, and the patient was blanched in a cold clammy sweat.

Immediate operation was performed, the wound opened up and a sub-peritoneal hæmatoma of the pelvic cellular tissue of the size of approximately a fœtal head was evacuated. It was then found that the hæmorrhage was of the general oozing variety and that beyond two small para-vaginal veins there were no bleeding points; and the previous ligatures were verified. Ligature of the two para-vaginal veins did not materially lessen the hæmorrhage.

Accordingly, with the morning's experience of Russell's viper venom fresh in his mind, the writer decided to take the risk of an intravenous injection of a minute dose of Russell's viper venom. The patient's condition was desperate and there was no doubt that death would ensue rapidly unless the hæmorrhage could be controlled. The 1 in 10,000 solution of the morning was again diluted with sterile double-distilled water 1 in 10 making a final strength of 1 in 100,000. Of this solution 0.5 c.cm. was injected into the vein and the effect on the pelvic cellular oozing noted. Since in 10 minutes no marked effect had been produced the injection was repeated. It then became apparent that the cellular tissue was visibly drying and the oozing was visibly lessening. Thereupon a vaginal drain was inserted and the pelvic peritoneum united and the wound was closed in layers in the ordinary way.

Immediate direct arm-to-arm transfusion of 500 c.cm. of blood was carried out on the operation table; and the patient left the table with a pulse of 140, a better colour and generally in better condition than when she was brought to the theatre. There was no further evidence of hæmorrhage and the patient's condition progressively improved. During the 48 hours after operation the loss per vaginam was less than the normal menstrual loss of a healthy woman.

The preparation of Russell's viper venom used in these cases was 'Stypven' made by Messrs. Burroughs Wellcome and Co., a sample of which had, most fortunately, kindly been left by their representative, Mr. A. C. Johnston. It should here be stated that the preparation as issued by Messrs. Burroughs Wellcome most definitely states that it is 'not for injection'. But in conversation with Mr. Johnston the latter observed that he had heard rumours that successful results had been obtained elsewhere by the intravenous injection of a preparation of fresh Russell's viper venom in a dilution of 1 in 100,000. On subsequent enquiry, however, it turned out that this dilution is injected intradermally and not intravenously in the institution concerned. In view of the desperate condition of the patient, and the morning's experience, the writer decided that the risk was justifiable, and the results are here recorded.

Case 3.—Capt. T., aged 68, European, was admitted into the Bowring Civil Hospital on the 27th October, 1936, suffering from rigors, biliary colic and jaundice. He gave a history

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of having bled freely all his life from slight injuries. Accordingly, his coagulation time was estimated on the 28th October and was found to be 9 minutes 20 seconds. His jaundice cleared up under medical treatment, but two subsequent severe attacks of biliary colic dictated operation. Accordingly, intensive calcium therapy was instituted and by the 15th November the coagulation time had been reduced to 6 minutes 30 seconds. Lower than 6 minutes it could not be brought with calcium and hæmoplastin.

The operation took place on the 20th November, the coagulation time that morning being 6 minutes. Half an hour before operation 0.5 c.cm. of 1 in 100,000 solution of Russell's viper venom was injected intradermally and the coagulation was estimated on the operating table before commencement. By then it had fallen to (complete coagulation) 4 minutes 30 seconds. The operation was commenced and the gall-bladder was found to be full of gall-stones, the cystic duct dilated and the common bile duct to be similarly filled with stones. The gall-bladder and 234 bile stones were removed, the common bile duct was drained, and the patient returned to bed.

During most of the operation, which was not without difficulty and took 75 minutes, there was no noticeable oozing in spite of the fact that several filmy adhesions, partially organized, had to be separated. In the final stages, however, when the abdomen was being closed, a certain amount of rather fluid oozing was noticed along the drainage tube left in Morrison's pouch. The coagulation time was accordingly estimated after the patient returned to bed, when it had risen to 5 minutes 45 seconds. A second 0.5 c.cm. intradermal injection of Russell's viper venom 1 in 100,000 was therefore given. Four hours later the coagulation was 5 minutes 30 seconds. In the evening, 8 hours after the second injection, the coagulation time had risen to 6 minutes; and, the next morning, 24 hours after the operation, the same value was obtained. After the second injection of Russell's viper venom all visible oozing along the tube completely stopped and did not recur.

Discussion

These three cases illustrate the use of Russell's viper venom as a styptic in three different ways. In the first case the preparation was used as the makers recommended after research on laboratory animals, and was a notable success. In the second case, the venom was used in a method which, so far as the writer is aware, has not been previously employed. The need was desperate and heroic measures were justifiable, and, in the event, justified.

In the light of the events here recorded it now seems probable that the assumption that both the postpartum hæmorrhage and the menorrhagia were metropathic in origin is, at least partially, incorrect. The patient is an Anglo-Indian woman in poor circumstances, and her tendency to hæmorrhage of the oozing type is, in the writer's opinion, more probably attributable to persistent malnutrition, and also to an imbalance in her diet. In consequence, the blood calcium was probably low and the vitamins, notably 'A' and 'C', were almost certainly deficient. While the writer would hesitate to repeat the intravenous injection of the venom except in grave emergencies, or in the control of bleeding where he had reason to suppose that the blood coagulation time was abnormal, he would have no hesitation whatever in repeating it in similar circumstances.

In the third case, so far as the writer is aware, the intradermal method has not previously been used as a prophylactic, although the intradermal injection of Russell's viper venom in cases of typhoid fever with hæmorrhage has, the writer believes, been used as a curative measure with conspicuous success in Mysore. This case is, in the writer's opinion, the most satisfactory and convincing of the three, in that it was possible to check the effect of the administration of the venom by the estimation of the coagulation time of the blood. The case would, therefore, appear to indicate that the intradermal injection of the Russell's viper venom does, in fact, lessen the coagulation time in patients where the latter is naturally high.

The writer is aware of the danger of deductions from isolated cases; but he does consider that these cases, especially the second and the third, are sufficiently impressive to justify their being placed on record, in the hope that such apparently dramatic results may be confirmed by other observers. Should they be so confirmed, venom therapy would appear to open up a wide new vista in the treatment of hæmorrhage. Hæmoptysis, hæmatemesis, hæmorrhage from duodenal and typhoid ulcers and, notably, military surgery are merely some of the obvious fields of employment of this remedy.

The writer is indebted to the courtesy of Dr. T. Seshachalam of Mysore for the details of intradermal technique, as employed in the Krishnarajendra Hospital there, kindly supplied after the operation on the second case. He further wishes to record his acknowledgments to Messrs. Burroughs Wellcome and Co., and to their representative, Mr. A. C. Johnston, for the supply of the sample of their preparation 'Stypven'.

Summary

(1) Three cases are recorded in which Russell's viper venom was used in the control of bleeding, the preparation being used differently in each case :

(*a*) by direct application,

(*b*) by intravenous injection, and

(*Continued at foot of next page*)

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THE MORTALITY OF OPERATIONS FOR VESICAL CALCULUS IN INDIA

By E. W. HAYWARD, F.R.C.S.E.
Principal Medical Officer, Jodhpur State

THE following is an analysis of 359 consecutive operations done by various surgeons in the Windham Hospital, Jodhpur, during the years 1933–35. The only cases excluded are those few who had small stones removed under local anæsthesia with cystoscopic rongeur forceps and one who also had a stone in the kidney which was successfully removed at the same operation as litholapaxy was performed and which has been classified under stone in the kidney. At the end, the records of 78 cases done in the first eight months of 1936 are partially analysed with those of the last half of 1935.

Previously published figures

Rowlands and Turner quote various mortality rates, the most recent being that of the Mayo Clinic which records 153 litholapaxies and 395 suprapubic lithotomies with death rates of 1.3 and 8.6 per cent, respectively. These figures presumably refer to well-fed Americans, whereas Sir Peter Fryer's figures consist chiefly of Indian ryots—a very different proposition. In my opinion Sir Peter's record of 986 litholapaxies and 116 suprapubics with death rates of 2.53 and 14.65 per cent is not likely to be improved upon to any great extent in India until the patients come for treatment before such health as is naturally theirs is weakened by months and years of pain and pyuria accompanied by the semi-starvation that is the lot of most who are no longer able during the monsoon weeks to till the field on whose produce they live from year to year. Better instruments and anæsthetics may help, but I am convinced that real improvement is impossible until the patients come so early that a stone of golf-ball size will fascinate those of us who to-day are scarcely interested in anything smaller than a cricket ball. Winsbury White quotes Anthony's wonderful results, but in the absence of details I am not prepared to comment on his 1,532 litholapaxies but only 56 lithotomies with death rates of 0.6 and 14.3 per cent, respectively.

The anæsthetic

Gas and oxygen were not used on any of the cases under reference. It was not at first available and even now has to be used very sparingly as each empty gas cylinder has to travel over 2,000 miles before it returns duly refilled. The normal anæsthetic used has been A. C. E. followed by ether given through a Shipway's apparatus. Spinal anæsthesia with either novocain, pantocain or Barker's stovaine has been used in some cases but often this was prevented by the patient having a very low blood pressure. Cases with chronic bronchitis were usually done under local novocain but, with this, wounds often tended to become septic and heal slowly, though this was due to the novocaine or to the patient's condition cannot be said. One or two litholapaxies were done with a local urethral anæsthetic, but this asks a good deal of the patient, however gentle one is.

Pre-operative treatment

The routine in stone cases starts with a sounding in the out-patient department. This may appear to be an out-of-date method, but with a thousand outpatients a day and a limited staff it is the quickest and cheapest, as the repair of a damaged sound that the patient has hurled on the floor costs less than the repair of a cystoscope that has gone the same way. I must add, however, that doubtful cases are subjected to both cystoscopy and radiography. After a day or two in bed, during which time the ecto-parasites that usually accompany the patients are caught, nails and hair are cut and bodies washed (often for the first time ever with soap as well as water), the patient is taken to the theatre. A cystoscopy is now always done except in the case of females and boys about ten years of age. Litholapaxy is regarded as the operation of choice and is always done when not contra-indicated. If contra-indicated suprapubic lithotomy is done.

Contra-indications to litholapaxy

I regard the following as the main contra-indications :—

1. General weakness of the patient making a long operation inadvisable. This is largely a matter of the size of the stone although the capability of the surgeon to perform a speedy crushing also counts. This is by far the most important contra-indication to litholapaxy and is the one that chiefly accounts for the large number of suprapubic lithotomies done and their much higher mortality.
2. Too small a urethra to permit the passage of a lithotrite of the size needed to crush the particular stone present. Above five years the age of the patient is almost immaterial as a small lithotrite can always be passed; it is the size of the stone that matters.
3. Stones impacted in the neck of the bladder.
4. Stones which are very large or very hard —we have not met any that are too soft or too small or formed round foreign bodies.
5. The presence of a diverticulum of the bladder or a much enlarged prostate.

(*Continued from previous page*)

(*c*) by intradermal injection.

(2) In view of the dramatic results obtained and the obvious wide field of employment for Russell's viper venom, if established, it is hoped that the cases here recorded will induce other observers to confirm the writer's results.

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6. Advanced cystitis with a contracted bladder.

7. Urethritis, undilatable urethral stricture and a small fibrotic bladder must also be remembered as rare contra-indications.

I do not regard a small papilloma or other new growth as a contra-indication to litholapaxy as it should be possible to tilt the table and keep the stone away from it; later on it can be treated by diathermy, thus avoiding a cutting operation, which is both distasteful to the patient and risky as to implantation.

Other operative methods

I have no experience of perineal litholapaxy or lithotomy, or of vaginal lithotomy, except that I have had to transplant the ureters in a man who had had most of his bladder and perineum destroyed by an enthusiastic perineal litholapaxist elsewhere.

Operative details

It does not seem necessary to go into these, except to say that the clean and unbruised bladder can usually be completely sutured after suprapubic lithotomy, a catheter being tied in per urethram and a rubber dam placed in the cave of Retzius. Septic bladders and those that have suffered much trauma during the withdrawal of the stone are best drained. Primary closing reduces the stay in hospital from an average of about 30 to 16 days. It must be remembered, however, that these long averages are largely due to the feeble old men who linger for weeks and will not heal up completely, but who cannot be discharged to their mud huts, perhaps fifty or more miles across the sandy desert from the nearest railway station, until they are fully healed and fit to face this journey, often on foot, at best on a camel or bullock cart.

Litholapaxy cases *can* be discharged after two or three days. I much prefer to keep them in for seven days at the end of which time they are cystoscoped. By this time all fragments of stone left behind at operation that are going to pass out per urethram have gone and if any piece is left, however small, it must be removed either by flushing with a Bigelow evacuator or through an operating cystoscope. Similarly any loose piece of mucous membrane must be removed and not left to form the nucleus of a second stone. Cystoscopy a week after litholapaxy also gives one an excellent idea of what damage has been done to the bladder—it is very seldom (except in the case of really small stones) that one does not see one or two areas of submucous hæmorrhage, and, with an inexperienced operator, the appearance reminds one of a case of confluent smallpox. I am sure that this delay before doing the final cystoscopy is more than justified by the negligible recurrence rate that it ensures. We can only remember one case coming back in the last five or six years, but unfortunately we have no accurate records on this point nor are follow-up clinics possible.

The mortality at different ages

This is clearly shown in the following table and no comment is needed :—

Age	Lithotomies	Died	Percentage mortality	Litho-lapaxies	Died	Percentage mortality	Total operations	Died	Percentage mortality
1 to 7 years.	139	6	4.3	27	0	nil	166	6	3.6
8 to 15 years.	36	2	5.5	6	0	nil	42	2	4.7
16 to 40 years.	21	3	14.2	53	1	1.8	74	4	5.4
41 to 60 years.	29	12	41.3	44	2	4.5	73	14	19.1
61 and over.	2	2	100	2	0	nil	4	2	50
	227	25	11	132	3	2.2	359	28	7.7

N.B.—These figures correspond closely with those for the previous four years which were 207 lithotomies with 22 deaths, a rate of 11 per cent, and 204 litholapaxies with 5 deaths, a rate of 2.5 per cent.

The causes of death

1. *Age group 1 to 7 years.*

(*a*) Heat exhaustion and hyperpyrexia on the first day.

(*b*) Asthenia with pneumonia. He had been classed as a bad risk before operation and died on the 12th day.

(*c*) Entero-colitis 20th day, cause unknown.

(*d*) Cerebral malaria 11th day, despite being quite well until the 10th day and receiving quinine.

(*e*) Diarrhœa and fever 2nd day. Cause unknown.

(*f*) Vomiting and diarrhœa of unknown origin beginning on the 11th day, till when the child had been quite well, and ending fatally on the 14th day.

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2. *Age groups* 8 *to* 15 *years.*

(*a*) Asthenia with râles in the lungs (a very feeble patient).

(*b*) Another weak patient developed basal congestion, then pneumonia and died on the 11th day.

3. *Age group* 16 *to* 40 *years.*

(*a*) Rupture of the bladder during litholapaxy accounts for one death.

(*b*) Asthenia claimed two patients who faded away one and two months respectively after operation.

(*c*) After spinal stovaine one man had a steadily falling blood pressure and respiratory embarrassment and died on the 3rd day.

4. *Age group* 41 *to* 60 *years.*

(*a*) Asthenia claimed four suprapubic victims who just faded away on the 5th, 13th, 20th and 120th days after operation and one litholapaxy case on the 7th day.

(*b*) Post-operative pneumonia accounts for four who died on the 2nd, 3rd, 7th and 17th days.

(*c*) One died from toxæmia on the 9th day, the bladder having been grossly septic at the time of operation.

(*d*) One died from heart failure on the 9th day, autopsy revealing advanced myocardial degeneration.

(*e*) One case was lost on the 3rd day, due to rupture of the bladder during litholapaxy.

(*f*) One collapsed and died very rapidly for no apparent reason on the 5th day after the removal of a stone and a diverticulum.

(*g*) Diarrhœa, possibly dysenteric, claimed one victim on the 14th day.

Of these all had a pre-operative note stating that their general health was poor or very poor except (*e*), (*f*) and (*g*).

5. *Age group* 61 *and over.*

(*a*) One feeble old man of, he said, 95 survived for 11 days and then died of pneumonia, the anæsthetic having been local novocain.

(*b*) Another feeble one died of exhaustion on the 21st day.

The mortality of different types of stones

No relationship between the chemical composition or the sizes of stones and the death rate was noticed. No really big stones were removed in this series; the largest only weighed 7 ounces 5 drachms when dry.

The mortality at different seasons

By the middle of 1935 we had realized that cases did much better in the cold weather than in the hot. Between June 1935 and August 1936, 136 cases were operated on, of which those done in 1935 are included in the three-year records given above, but those of 1936 are now analysed for the first time.

Of nine cases that died out of the 136 operated on, none died between 1st October and 30th April. The worst months here climatically are May to September when the thermometer may reach 123°F. in the shade and just before the rains break in July the humidity also is very high. There were no selection of cases, they came fairly regularly all the year round, with however some increase during the hot weather when they do not work in their fields. Fans are of course provided in the wards but they only stir up the hot air and do not really cool the patient down. The operating theatres are air-conditioned.

The mortality at different concentrations of blood urea

Similarly by the middle of 1935, a connection had been noticed between raised blood ureas and the operative prognosis. Of the 136 cases operated on since then, 59 did not have their blood urea taken as 52 of them were children under 16 years and seven of them had to be operated on soon after admission owing to a certain degree of retention of urine. The urine urea was not done in any case. The 77 cases whose blood ureas were examined resulted as follows:

Blood urea	Lithotomies	Died	Percentage mortality	Litho-lapaxies	Died	Percentage mortality	Total operations	Died	Percentage mortality
(*a*) 25 to 50	16	3	19	52	1	2	68	4	6
(*b*) 50 to 60	2	1	50	1	1	100	3	2	66
(*c*) Over 60	2	1	50	4	0	nil	6	1	17

From this, the mortality of those with blood ureas under 50 mgm. is seen to be 6 per cent while of those over 50 it is 33 per cent.

The causes of death

In the two young children out of the 59 cases whose blood urea was not done, the cause of death was heat stroke in one, coming on ten hours after the operation with a rapid rise of temperature and convulsions, and in the other diarrhœa and vomiting which began on the 11th day, ending fatally within 48 hours.

The causes in the cases whose blood ureas are recorded in the groups above were :—

Suprapubic lithotomies.

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(*a*) 1. Collapsed on 5th day and died for no apparent reason [*see* 4. Age group 41-60, (*f*)].

2. Faded away 5th day after spinal anæsthetic and slight accumulation of fluid in cave of Retzius which did not drain well along the rubber dam.

3. Very septic bladder. Was given ACE, followed by open ether. Died apparently from chloroform poisoning on the 4th day.

(*b*) Very poor subject. Local novocain anæsthesia. Died on the 3rd night of myocardial failure.

(*c*) Poor subject, slightly insane. Local novocain anæsthesia. Recovered enough to go in a wheeled chair by 15th day, then faded away and died on the 29th day.

Litholapaxies.

(*a*) Rupture of bladder [*see* 3. Age group 16-40 (*a*)].

(*b*) Fell down dead while walking back from the latrine the day after operation. No post-mortem.

Summary

The prognosis of operations for vesical calculus appears to become progressively less favourable as the age of the patient increases. A blood urea of over 50 also reduces his chance of survival to 67 per cent as compared to 94 per cent if it is under 50 mgm. During one cold weather no deaths occurred but they started again as soon as the next hot weather arrived. Climatic conditions therefore appear to have some effect.

The 11 per cent mortality of suprapubic lithotomy is so much higher than the 2.2 per cent of litholapaxy because the latter is the operation of choice, while the former is done on those cases who are unfit for a long, general or a spinal anæsthetic or who have very large stones or septic bladders and are obviously bad risks from the very beginning. Little if anything can be done to reduce this mortality under the present conditions of life of the patients, whose poverty, physique and ignorance has to be seen to be believed. The risk of litholapaxy is very slight (1 in 132) apart from the surgical error of rupturing the bladder (2 in 132), a tragedy which has occurred less frequently as the various operators have become more experienced, although attempting to crush a relatively big stone in a small bladder may lead to this tragedy even in the best hands.

In conclusion, a stone case who is physically fit and young would appear in a good climate to have an excellent prognosis, but the feeble old man with a high blood urea in the middle of the hot weather is a very grave surgical risk.

The prognosis of these cases seems to depend really on the ability of the system to withstand the shock even of a rapid (6-12 minutes)

(Continued at foot of next column)

DEEDS OF VIOLENCE IN INDIA IN 1935-36 AND OTHER CRIMES IN WHICH SEROLOGY PLAYS A PART

By S. D. S. GREVAL, B.SC. (Punjab), M.D., CH.B., D.P.H. (Liverpool)

MAJOR, I.M.S.

Imperial Serologist and Chemical Examiner to the Government of India, Calcutta School of Tropical Medicine

IT occurred to me that a little amplification of one of the tabular statements prepared for the annual report on the working of this department would make the figures given therein useful to the ethnologist, the economist and the statistician. This has been done. Purports have been added to the enactments.

The department is connected with the deeds of violence thus : Chemical examiners in the provinces receive all the suspected materials, they forward to the department all exhibits on which they find blood; but as often as not they also forward exhibits on which they have not found blood, with the remarks 'Blood not confirmed'. The department undertakes to determine the origin of the blood, human or animal. Material other than blood is also received and its origin determined serologically, *e.g.*, semen, flesh, bone, etc.

The table gives only the enactments under which enquiries were being made against an alleged wrong-doer at the time the suspected material was collected. This fact would account for the frequent interchange of the allied sections of the Indian Penal Code. Multiple enactments or enquiries under sections dealing with comparatively trivial failings of human conduct are legal manœuvres.

The table does not give (1) the exact total of all crimes of violence, (2) convictions or even (3) cases found positive for the evidence sought for. It is on the whole, however, a good indicator of crimes committed in the country

(Continued from previous column)

suprapubic lithotomy under local novocain. The straw that breaks the camel's back may be the heat of the ward, the general weakness of the patient or a certain degree of renal inefficiency, but nearer than that I have been unable to get in considering the causes of death after operations for vesical calculus.

Those who have worked among the ryots of India will not enquire why the more unfavourable cases are not postponed till they are fit and the weather cool. To those who have not worked here, I would say come and see the physique and mentality of these people before being too critical of our operative mortality.

Finally I must record my gratitude to my colleagues, Dr. B. L. Mehta and Dr. J. S. Mathur, for their great help in the preparation of this note.

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A table showing the number of cases of crime in India, by provinces, under various enactments, tested by the Imperial Serologist and Chemical Examiner to the Government of India, Calcutta, in 1935-36.

	Madras	Punjab	United Provinces	Bengal	Bihar and Orissa	Bombay	Sind	[Bombay and Sind	Burma	Central Provinces	N. W. F. Province	Assam	Indian States	Centrally administered areas						Total
														Baluchistan	Delhi	Political Agencies	Deccan	Ajmer-Merwara	Coorg	
302 Punishment for murder ..	769	494	296	143	155	285	104	389	147	82	84	44	94	5	10	5	2	4	1	2,724
326 Voluntarily causing grievous hurt by dangerous or sharp weapons.	39	31	8	14	12	12	1	13	52	10	6	2	3	..	..	..	..	..	..	190
376 Punishment for rape ..	17	37	58	51	43	19	7	26	11	1	4	7	3	..	..	1	..	2	..	261
304 Punishment for culpable homicide not amounting to murder.	19	59	22	15	21	29	16	45	1	3	28	4	5	..	..	1	..	..	..	223
307 Attempt to murder ..	49	70	53	8	6	5	3	8	4	..	3	..	4	..	4	..	..	..	..	209
324 Hurt by dangerous or sharp weapons.	23	8	2	8	1	4	1	5	15	2	1	..	1	..	..	..	..	..	..	66
397 Robbery with attempt to cause death or grievous hurt.	11	1	4	3	2	..	..	..	6	..	..	..	..	..	..	..	..	..	..	27
394 Voluntarily causing hurt in committing robbery.	6	7	6	3	1	2	..	2	..	..	..	..	..	..	..		..	..	..	25
377 Unnatural offences ..	..	23	17	10	7	1	3	4	..	1	5	1	3	1	..	..	..	..	..	72
147 Punishment for rioting ..	4	..	1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7
148 Rioting armed with deadly weapons.	..	..	..	..	3	..	..	..	..	..	1	..	..	..	..	..	..	..	..	4
295 Defiling place of worship ..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
304A Causing death by negligence ..	3	4	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9
305 Abetment of suicide of child and insane person.	..	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	2
306 Abetment of suicide ..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
308 Attempt to commit culpable homicide.	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
309 Attempt to commit suicide ..	2	..	1	1	..	..	1	1	3	..	1	..	..	..	..	..	..	..	..	9
312 Causing miscarriage ..	..	..	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	2
313 Causing miscarriage without consent.	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
317 Abandonment of child ..	..	2	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	3
318 Concealment of birth by secret disposal of dead body.	1	3	3	..	3	7	..	7	..	..	2	..	..	..	..	..	..	..	..	19
320 Grievous hurt	..	..	..	..	..	10	..	10	..	..	..	..	1	..	..	..	..	..	..	11
321 Voluntarily causing hurt ..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
323 Punishment for voluntarily causing hurt.	2	2	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
325 Punishment for causing grievous hurt.	1	5	..	..	1	2	..	2	5	..	..	..	..	..	..	..	..	..	..	14
333 Causing grievous hurt to public servant on duty.	1	..	..	..	..	1	..	1	..	..	..	..	..	..	.	..	..	..	..	2

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333 Causing grievous hurt to public servant on duty.	1	..	..	..	..	1	..	1	..	..	..	..	..	..	.	..	..	..	..	2
337 Causing hurt by endangering life or personal safety.	1	..	..	1	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	3
342 Punishment for wrongful confinement.	..	..	..	...	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
354 Criminal force to outrage a woman's modesty.	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
359 Kidnapping	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	2
363 Punishment for kidnapping ..	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
364 Kidnapping or abducting to murder.	1	2	..	2	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	6
379 Punishment for theft ..	1	..	..	2	5	..	..	..	5	..	..	..	..	..	..	..	..	..	..	13
380 Theft in dwelling house ..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	2
382 Theft after preparation for causing death.	..	2	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	4
392 Punishment for robbery ..	2	..	..	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	4
395 Punishment for dacoity ..	..	2	1	9	6	1	..	1	..	..	..	2	..	..	..	..	..	..	..	21
396 Dacoity with murder ..	1	1	2	4	1	2	..	2	..	..	..	1	1	..	..	..	..	..	..	13
398 Attempt to commit robbery or dacoity with deadly weapons.	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
428 Killing or maiming animals worth Rs. 10.	..	..	..	..	..	..	..	..	..	..	1	..	8	..	..	..	..	..	..	9
429 Killing or maiming animals worth Rs. 50.	1	..	1	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	3
448 Punishment for house trespass	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1
452 House trespass after preparation for causing hurt, etc.	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	2
456 Punishment for house trespass or house breaking by night.	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
457 Lurking house trespass or house breaking by night in order to commit offence.	..	..	1	1	1	..	..	..	3	..	..	..	..	..	..	..	..	..	..	6
458 Lurking house trespass or house breaking by night after preparation for hurt, etc.	..	2	3	..	1	..	..	..	3	..	2	..	..	..	..	..	..	..	..	11
459 Grievous hurt caused whilst committing house trespass or house breaking.	..	2	1	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	5
460 Jointly house breaking or lurking where death or grievous hurt caused.	..	7	3	..	..	..	..	..	..	..	3	..	1	..	..	..	..	..	..	14
302, etc. Punishment for murder, etc.	2	64	43	53	55	1	14	15	14	14	22	10	6	..	1	1	..	..	..	300
326, etc. Voluntarily causing grievous hurt by dangerous or sharp weapons, etc.	..	7	5	11	2	..	..	..	1	..	1	..	..	..	..	.	..	..	..	27
376, etc. Punishment for rape, etc. ..	..	11	7	29	4	..	..	..	1	2	4	5	..	..	1	..	..	..	..	64
304, etc. Punishment for culpable homicide not amounting to murder, etc.	1	12	8	10	10	..	6	6	..	..	1	2	..	..	..	..	..	..	..	50
307, etc. Attempt to murder, etc. ..	1	20	8	3	8	..	1	1	..	2	9	..	..	..	..	..	..	..	..	52
324, etc. Hurt by dangerous or sharp weapons etc.	..	..	..	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	3
394, etc. Voluntarily causing hurt in committing robbery, etc.	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1

(*Continued*)

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TABLE—*concld.*

	Madras	Punjab	United Provinces	Bengal	Bihar and Orissa	Bombay	Sind	[Bombay and Sind	Burma	Central Provinces	N. W. F. Province	Assam	Indian States	Centrally administered areas: Baluchistan	Delhi	Political Agencies	Deccan	Ajmer-Merwara	Coorg	Total
377, etc. Unnatural offences, etc.	:	2	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	2
143, etc. Punishment for unlawful assembly, etc.	:	:	:	1	2	:	:	:	:	:	:	:	:	:	:	:	:	:	:	3
147, etc. Punishment for rioting, etc.	:	7	11	7	7	:	:	:	:	:	1	1	:	:	:	:	:	:	:	31
148, etc. Rioting armed with deadly weapons, etc.	:	13	5	7	15	:	1	1	:	:	7	:	:	:	:	:	:	:	:	48
149, etc. Members of unlawful assembly guilty of offence committed in prosecution of common object, etc.	:	1	:	:	1	:	:	:	:	:	1	:	:	:	:	:	:	:	:	3
201, etc. Screening offence, etc.	:	1	1	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	2
308, etc. Attempt to commit culpable homicide, etc.	:	1	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	1
317, etc. Abandonment of child, etc.	:	1	:	:	:	:	:	:	:	:	3	:	:	:	:	:	:	:	:	3
318, etc. Concealment of birth by secret disposal of dead body, etc.	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	1
320, etc. Grievous hurt, etc.	:	2	:	:	:	:	:	:	:	:	2	:	:	:	:	:	:	:	:	2
324, etc. Hurt by dangerous or sharp weapons, etc.	:	5	1	1	4	:	:	:	:	:	:	:	:	:	:	:	:	:	:	13
325, etc. Punishment for causing grievous hurt, etc.	:	:	1	2	1	:	:	:	:	:	:	:	:	:	:	:	:	:	:	4
327, etc. Voluntarily causing hurt to extort property or to constrain to an illegal act, etc.	:	:	:	:	:	:	:	:	:	:	1	:	:	:	:	:	:	:	:	1
333, etc. Causing grievous hurt to public servant on duty, etc.	:	2	1	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	3
341, etc. Punishment for wrongful restraint, etc.	:	1	:	:	:	:	:	:	1	:	:	:	:	:	:	:	:	:	:	1
342, etc. Punishment for wrongful confinement, etc.	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	1
354, etc. Criminal force to outrage a woman's modesty, etc.	:	:	:	1	:	:	:	:	:	:	:	1	:	:	:	:	:	:	:	3
363, etc. Punishment for kidnapping, etc.	:	1	1	:	:	:	:	:	:	:	2	:	:	:	:	:	:	:	:	6
366, etc. Kidnapping to compel a woman into marriage, etc.	:	1	4	:	1	:	:	:	:	:	:	:	:	:	:	:	:	:	:	2
379, etc. Punishment for theft, etc.	:	:	:	:	1	:	:	:	:	:	1	:	:	:	:	:	:	:	:	2
380, etc. Theft in dwelling house, etc.	:	:	:	1	1	:	:	:	:	:	:	:	:	:	:	:	:	:	:	2
392, etc. Punishment for robbery, etc.	:	:	:	1	2	:	:	:	1	:	1	:	:	:	:	:	:	:	:	5
395, etc. Punishment for dacoity, etc.	:	:	:	1	:	:	:	:	9	:	1	:	:	:	:	:	:	:	:	11

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392, etc. Punishment for robbery, etc.	..	..	..	1	2	..	..	..	1	..	1	..	..	..	..	..	..	..	..	5
395, etc. Punishment for dacoity, etc.	..	..	..	1	..	..	..	..	9	..	1	..	..	..	..	..	..	..	..	11
429, etc. Killing or maiming animals worth Rs. 50, etc.	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
448, etc. Punishment for house trespass, etc.	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
452, etc. House trespass after preparation for causing hurt, etc.	..	3	1	3	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8
457, etc. Lurking house trespass or house breaking by night in order to commit offence, etc.	..	1	..	4	2	..	..	..	..	..	..	1	..	..	..	..	..	..	..	8
458, etc. Lurking house trespass or house breaking by night after preparation for hurt, etc.	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
459, etc. Grievous hurt caused whilst committing house trespass or house breaking, etc.	..	..	..	..	..	..	1	1	..	..	..	1	..	..	..	..	..	..	..	2
460, etc. Jointly house breaking or lurking where death or grievous hurt caused, etc.	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	1
461, etc. Breaking receptacle containing property, etc.	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
54 C. P. C.—Arrest	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
174 C. P. C.—Enquiry on suicide ..	..	1	1	1	2	..	..	..	..	..	3	..	..	..	..	..	..	..	..	8
399 Making preparation to commit dacoity, and 20—Arms Act.	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1
292 Gwalior Penal Code ..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	3
294 Gwalior Penal Code ..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1
Goonda Act 1 of 1923 and 332—voluntarily causing hurt to deter public servant from his duty.	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Unnatural death	1	..	..	1	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	2
No action taken by Police ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
GRAND TOTAL ..	962	925	587	423	394	389	161	(550)	291	117	205	82	135	6	16	8	2	6	1	4,710

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and makes possible at a glance a comparison between the various provinces.

The following extract from a case, apart from the intrinsic interest it has as an account of a human sacrifice, will show how a negative serological finding may be compatible with conviction :—

Sessions case No. 49 *of* 1936

Salem Division, Madras

Prisoner—Chinna Chetti *alias* Munippan.

Offence—Section 302, I. P. C.—murder.

'On the night of the 31st December, 1935, he intentionally killed his son, Hanumadu.

The deceased, a suckling babe at the time of his death, was the youngest of his three children by his wife (P. W. 7), who lived with him at Bennangur about 25 yards from the Karaga Mariamman Temple. About three weeks before the occurrence, he proposed to her the sacrifice of one of their children to the Mariamman goddess, as an effective method of getting access to hidden treasure buried in a forest and becoming wealthy; but she did not take him seriously. After taking his supper with toddy and fowl curry at about 10 p.m. on the day of occurrence, he left the house saying that he had to go to the village, and, returning about a quarter of an hour later, went to bed. Some time after this, as she was just getting sleep, she saw him stand for a while near the bamboo cradle where the deceased slept, and abruptly go out of the house closing the door behind him. When she woke up shortly afterwards to suckle the child, she found it missing from the cradle. Thereupon she came out, and, seeing light at that untimely hour in the temple, ran there, when to her great horror she saw her husband place the severed head of the child in a mud bowl, used as a lid for a mud pot, containing two karagams (sacred pots) secured in a pit which served as an altar in front of the idol. He next covered the bowl with a granite slab. P. W. 7. set up a yell at this ghastly sight, but the accused encouragingly asked her not to cry saying that the goddess will perform a miracle and restore the child; and pushing her away carried the trunk of the infant towards the burial ground about a furlong away.....

..... In the lower court, P. W. 7 posing as an eye-witness deposed that she found her husband put his foot on the child's chest and sever its head from the trunk with M. O. 1, their bill-hook. But neither here nor before the village headman did she claim to have actually witnessed the deed. It is not unlikely that when P. W. 15 noticing some stains on her sari (certified by the chemical examiner not to be of blood) questioned her about them, she developed the story of having been an eye-witness to the commission of the crime by her husband and produced M. O. 1 in proof of her assertion. The Imperial Serologist could discover only the blood of a bird (probably a fowl) on this weapon..... These circumstances seem to suggest that P. W. 7 was at first probably a consenting party to the child's sacrifice and possibly believed that such an act of apparent religious merit might even redeem its life. So grotesquely superstitious and credulous are some of the village folk..... One fact emerges from her inconsistent statements, namely, that she cannot be trusted in all that she says..... The accused's plea of alibi stands unproved, and I find not the slightest reason for disbelieving the neighbours who saw him that night in his house and were told by him that P. W. 7 was weeping for nothing.....

The assessors' unanimous opinion that the accused is not guilty is based solely on the untrustworthiness of P. W. 7's testimony..... Disagreeing therefore from the assessors, I find him guilty as charged. Only one sentence is possible.....till he is dead'.

The bill-hook, evidently, figured in the fowl curry and not in the decapitation of the infant.

A CASE OF HÆMOGLOBINURIA CAUSED BY PLASMOCHIN TAKEN AS A PROPHYLACTIC AGAINST MALARIA

By MIN SEIN, M.B. (Cal.), M.R.C.P. (Lond.)
CAPTAIN, I.M.S.
Civil Surgeon, Toungoo, Burma

As far as I could make out from limited references no case has been recorded in which plasmochin, taken as a prophylactic against malaria, has resulted in hæmoglobinuria. The interest in the following case lies in the fact that hæmoglobinuria could be definitely attributable to the taking of plasmochin.

The patient, an Indian sepoy (J. S.), aged 20 years, was one of the party of men from the 1/17th Dogra Regiment engaged on a flag march in the jungle in Tharrawaddy district in Lower Burma, between the 31st October and 5th November, 1932. Each man was being given 0.04 gramme plasmochin daily as a prophylactic against malaria. After the end of the fourth day's march (*i.e.*, on 3rd November), he reported sick and was transferred to Mingaladon by train. His complaints then were being feverish, general abdominal discomfort and pain without nausea or vomiting. He was admitted into the British Military Hospital (I. W.), Mingaladon, on 5th November for the following complaints:—

Pain in the left upper quadrant of the abdomen, and fever. The pain was mild and temperature was 99.5°F. in the morning and 100°F. in the evening. There was no previous history of malaria. Physical examination was negative. There was no superficial nor deep tenderness. Spleen was not enlarged. No malarial parasites were found in the blood smear. Next morning he was reported to have had a 'fainting fit'. The sub-assistant surgeon who saw him first found him in a state of shock with cold extremities, covered with sweat. The pulse was weak and thready. He recovered soon after and was treated for collapse. I saw him a little while later when he complained of pain in the left loin. The patient explained that he had an acute attack of abdominal pain limited to the left side which was so severe that it doubled him up and that he had lost consciousness.

The patient was found to be markedly jaundiced and in a state of collapse with cold and cyanosed extremities. Temperature was normal; pulse was soft but regular and of normal rate. Hæmic murmur was heard in the pulmonary area. Pain was complained of just below the last rib on the left side on bimanual pressure and on deep inspiration. The kidneys were not palpable. There was slight œdema of the feet.

The patient could not pass urine when asked to do so. Close questioning elicited the fact that the patient had passed dark-coloured urine since the 3rd November, but had not reported this as he has taken no notice of this fact. Treatment was instituted with warmth, and massive doses of alkaline diuretics. At about noon the patient passed about 10 ounces of urine which was port wine in colour. The urine contained bile, blood pigment and albumin. Microscopic examination revealed few red blood cells, and epithelial cells. Glucose and sodium bicarbonate, barley water and soda water were given *ad lib.* There were no malarial parasites in the blood smear.

Subsequent progress:—

There was fever for a few days. Jaundice became very marked and generalized on the next day and the patient complained of giddiness. General condition was fair. Malarial parasites were not found in the blood smears taken on several occasions. The red blood cell count was 3½ millions, and the leucocyte count 7,500 per c.mm. Hæmoglobin was 45 per cent. Urine was still port wine in colour and contained bile, blood pigment, albumin, and a few red blood cells. The total

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quantity passed during 24 hours was 60 ounces. Differential count showed polymorphonuclears 67 per cent, lymphocytes 25 per cent, large mononuclears 7 per cent and eosinophiles 1 per cent. Large doses of ferri et ammonii citras were given with a little arsenic.

The condition gradually improved day by day and by the 15th November the jaundice had cleared up, but anæmia was still marked. The pain and tenderness in the loin disappeared in a few days. The patient was discharged cured on the 30th November when red blood cells were 4½ millions and leucocytes were 7,600 per c.mm. and hæmoglobin 85 per cent.

The following examinations were also done:—Blood and urine culture—negative. Van den Bergh's test—direct reaction was negative and indirect reaction was positive. The patient was examined regularly afterwards but recovery was complete and maintained.

Comment

In spite of widespread interest maintained, the cause of hæmoglobinuria (blackwater fever) has never been satisfactorily determined. Cases have been published where the onset of hæmoglobinuria had occurred under the following conditions :—

(1) Independently in a recognized malarial subject.

(2) During an attack of malarial fever—

(*a*) when quinine had not been given,

(*b*) when the patient had been treated with quinine alone or in combination with other drugs, and

(*c*) when atebrin and plasmochin had been given.

Several authorities are agreed that quinine may start an attack of hæmoglobinuria (blackwater fever). Similarly, cases have been published in which treatment of malaria with plasmochin, with or without atebrin, had resulted in hæmoglobinuria. But there seems to have been no record of hæmoglobinuria occurring as a result of taking plasmochin as a prophylactic, though it has been used extensively for this purpose. During the Burma Rebellion (1930–32) plasmochin was used extensively, side by side with quinine, as a prophylactic against malaria. In the Pegu area where I was in medical charge of the troops, about 300 men received a daily dose of 0.02 gramme plasmochin during November and December 1931. The minimum period of administration was three weeks and the maximum seven weeks. A careful watch was kept for any untoward symptoms but in all there were not more than half a dozen cases in which the symptoms complained of were mild epigastric pain or colic, easily controlled by stopping the administration of the drug and giving gastric sedatives. This is in conformity with the experience of others who have used the drug for a similar purpose. But the case described demonstrated that such a small dose as the total amount given in four days, *i.e.*, 0.16 gramme, could, in susceptible subjects, result in hæmoglobinuria. In this case, either due to defective excretion, to idiosyncrasy, or to both, the drug caused a massive and

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THE DENUDED PENIS AFTER OPERATION FOR ELEPHANTOID SCROTUM

By M. M. CRUICKSHANK

LIEUTENANT-COLONEL, I.M.S.

General Hospital, Madras

THE treatment of the penis entirely denuded of skin after operative treatment for elephantoid conditions of the penis and scrotum has never proved satisfactory. Several lines of treatment have been advised.

The application of a Thiersch graft, the usual procedure, results in a penis which is simply tucked down to the pubic region by a tight collar of fibrous tissue, the stretched penis, upon which the grafts have been laid, collapsing inside the bandage, the moment tension ceases, the grafts merely tucking up round its base.

Connell (1932) states that Thiersch's method appears to be unsuitable and that he personally has never used it. His method of dealing with the raw penis is by threading it through a subcutaneous tunnel on the inner aspect of the thigh and liberating it some ten days later by means of a simple flap incision.

This flap, which must be broad when dissected up, gives the penis an abnormally bulky covering of skin and subcutaneous tissue. The result however is not always a happy one, because, unless broad, the flap may become gangrenous, may not fit round the penis without a certain amount of tension, and, as a result, a considerable amount of scar tissue forms on

(*Continued from previous column*)

sudden hæmolysis with the resulting hæmoglobinuria. From this it may be deduced that in blackwater fever also the toxins of the malarial parasites by themselves or with the help of drugs such as quinine, atebrin or plasmochin might cause massive hæmolysis, hæmoglobinæmia and hæmoglobinuria in susceptible individuals.

I have to thank the Officer Commanding the British Military Hospital (I. W.), Mingaladon, for permission to publish the above case which was under my charge whilst I was a medical officer attached to that hospital.

[*Note.*—The writer has used synonymously hæmoglobinuria, a symptom, and blackwater fever, a clinical syndrome; this is not in our opinion justifiable.

He refers to the frequent use of plasmochin as a prophylactic in malaria. We are doubtful if it was ever used very extensively as a *personal* prophylactic, as early in 1931 a crucial experiment was performed in which it was shown that a total dose of 0.42 gramme of plasmochin given over a period of a week did not give protection against malarial infection. Such a dose may be expected to cause symptoms in quite a large percentage of the people taking it.

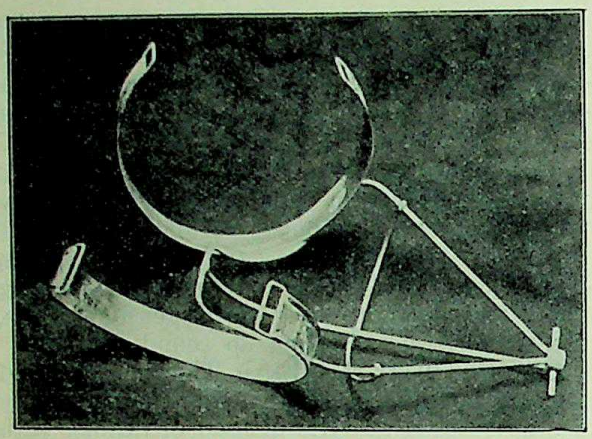
The value of plasmochin lies in its anti-gametocyte powers. A total dose of 0.06 gramme is usually sufficient to clear the blood of gametocytes; in this capacity it is valuable as a *general* prophylactic measure.—EDITOR, *I. M. G.*]

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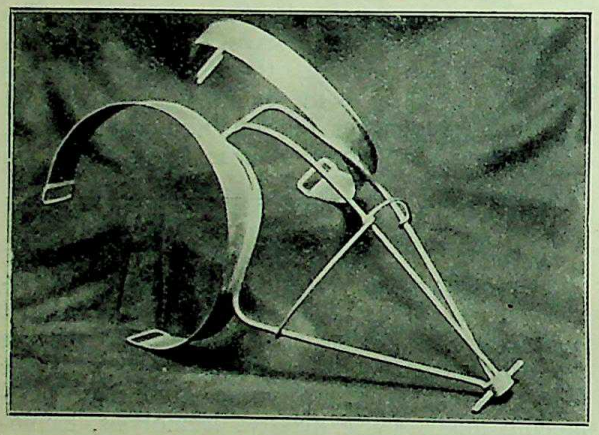
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the penis which tends to vitiate results which at the best cannot be termed æsthetic.

In an endeavour to avoid death of parts of the flap, I have dissected up and clothed the penis, short sections at a time. The ultimate



result is no better, because the organ, due to the vagaries of fibrosis, is misshapen and requires several plastic operations to render it more or less straight and central.



Again, I have tried making use of a pedicle graft from the thigh with which to clothe the penis. The results are about the same as those obtained by the 'tunnel' operation.

Such disheartening results might, I thought, be obviated could the penis but be kept extended for a time sufficient to allow pedicle flaps or Thiersch grafts to 'take'.

With this object in view I had made a splint on the lines of a Cabot splint, with bands encircling the thighs, by means of which it could be fixed in one position, these bands lying in the groin along Poupart's ligament, so that even if the patient pulled his knees up in bed yet the apex of the splint remained approximately in the same position. The penis is extended by means of a silk suture passed deeply through the region of the frænum and

(*Continued at foot of next column*)

RHEUMATIC FEVER IN THE PUNJAB

By B. L. KAMRA, M.B., B.S.

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EVIDENCE in support of the existence of rheumatic fever in the Punjab has been presented by Hughes and Yusuf and Wig. The purpose of this article is to support the view of the above workers, and to attempt to gauge the frequency of the disease in this rural area of the Punjab.

Out of the new patients under 30 years of age, attending the outdoor department of this dispensary during the period extending from 12th August, 1935, to 19th November, 1935, as

(*Continued from previous column*)

tied to the small cross bar at the apex of the splint.

So positioned, movements of the thighs are not transmitted to the splint in any degree sufficient to pull out the extending suture. Long Thiersch grafts are now cut from the thigh—one or two will suffice—and applied like a roller bandage to the penis from the corona to the base, care being taken to see that at the base the graft is made to lie snugly under the thick pubic skin.

At points along its course the graft is tucked down at its edge by fine catgut sutures. This prevents any movement on the part of the graft, which is simply covered with a piece of gauze soaked in sterile liquid paraffin applied as a small roller bandage. I have tried applying the grafts vertically along the penis but better results have followed in those cases where the graft or grafts have been applied as one would a roller bandage. The post-operative result, both from cosmetic and utilitarian view-points, is far superior to that obtained by the methods mentioned above where no splint is used. That some shrinkage of these grafts will take place cannot be denied, but, judging from results a month after operation, I feel sure that the final result will be very satisfactory.

It now remains to be seen, whether or not, using this splint, better results will follow the use of a Thiersch graft or a full thickness pedicle graft.

The splint has been made for me by Messrs. Hebbar Brothers Ltd., 246, Thambu Chetty Street, Madras.

To Dr. Hebbar I am much indebted for the help he has afforded me in making various models of the splint.

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many as could conveniently be done were daily examined for valvular lesions and an attempt was made to elicit choreic movements, if present, by asking them to spread out their hands with palms downwards. On meeting with positive signs, careful enquiry regarding past history of rheumatic infection was recorded. Twenty patients were examined daily and the total number thus examined was 1,000. The findings are tabulated below :—

The total population of these villages is 5,625 and the number of persons seen by the writer during the last 12 months that are known to have suffered from rheumatic fever with or without consequent endocarditis were 12, that is, 2.13 per thousand of the total population.

During the period extending from 1st January, 1933, to 30th September, 1935, 247 cases were treated in the indoor department of this dispensary for different diseases. Out of these, four

TABLE

Abstract of the examination of 1,000 *cases (outdoor) for rheumatic infection*

Age groups	Number of cases free from rheumatic infection	Cases of articular rheumatism		Cases of rheumatic endocarditis		Total
		Male	Female	Male	Female	
1 to 5 years ..	448	..	..	..	..	448
6 to 10 „ ..	159	..	..	..	1	160
11 to 15 „ ..	109	..	..	1	1	111
16 to 20 „ ..	120	1	..	1	1	123
21 to 25 „ ..	84	..	1	..	1	86
26 to 30 „ ..	72	..	..	..	..	72
TOTAL ..	992	1	1	2	4	1,000

In the course of this search for valvular lesions, which on account of the rush of work in the 'outdoor' could only be done by auscultation, both systolic and diastolic murmurs in the mitral area and systolic murmurs in the pulmonary were met with. The latter was always disregarded and not accepted as evidence of rheumatic infection; they were found to be hæmic murmurs in all cases. The mitral systolic bruit was found in cases of prolonged pyrexia and anæmia; it was due to the atony of the myocardium and the consequent dilatation of the mitral ring. It always disappeared soon after the removal of the cause. Mitral systolic murmur, therefore, was not taken as evidence of rheumatic infection, unless there was a definite history of acute or sub-acute articular rheumatism or chorea.

The sound in the mitral area normally varied so much in character in different cases as to make its alteration or prolongation unreliable in indicating rheumatic endocarditis.

In all the cases tabulated above as cases of present or past rheumatic infection there was no question of syphilis or atheroma. I was satisfied that all were clinically true cases of rheumatic infection.

This dispensary is situated in a village, named Rattewala (Sohangarh), tehsil Muktsar, district Ferozepore. It receives patients for its 'outdoor' from the villages around, covering an area of about 48 square miles.

cases were of acute rheumatic fever and three of mitral stenosis with past history of subacute or acute articular rheumatism. Notes on these four cases are given below :—

(1) S., a Mohammedan male, 14 years of age, was admitted on 31st July, 1935, with severe pain in joints and high fever (102.1°F.). The illness started seven days ago with discomfort and slight pain in the small joints of both feet. Two days later the pain became worse and the patient was laid up with high fever. The knee, ankle, and wrist joints became involved successively. The pain was shifting in character; ankle, knee, and tarsal joints were swollen; the left knee had fluid in it. They were so painful that even the slightest movement was impossible. Pulse was regular and 112 per minute with normal tension and full volume. Apex beat was in the fifth intercostal space in the mammary line. The cardiac dullness had increased transversely. Soft systolic bruit was present in the mitral area.

He was put on sodium salicylate, gr. 20, four times a day (80 grains per diem), to which he responded wonderfully. On admission, he could not even turn over and within 24 hours he could not sit up in bed. On 6th August the dose of the salicylate was decreased to 30 grains a day, when trouble relapsed in the right ankle and readily subsided on increasing the dose to 100 grains a day.

He was discharged at the request of his father on domestic grounds with instructions to continue taking medicine. Systolic bruit was present then in the mitral area on 13th August.

On 4th November, 1935, he was again examined and found suffering from an attack of chorea. Systolic bruit in the mitral area was present.

(2) M. S., 32 years of age, carpenter by profession, was admitted on 1st May, 1935, for pain in the joints. About a month ago his illness started with acute pain.

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The joints to be first involved were the shoulders and back joints. Next the fingers and elbow joints were affected. The pain was shifting in character. The joints first involved cleared up and a fresh set was next affected. In this way the patient mentioned all the joints which at one time or other got involved. On admission the knees, wrists and ankle joints were swollen and painful. The patient was confined to bed. His temperature was 99.4°F.

There was roughening of the first sound at the mitral area, otherwise heart was apparently normal.

He was put upon sodium salicylate, a drachm a day. Pains disappeared within one week and he was discharged cured on 16th May. Since July 1935, he has been working as a carpenter, engaged in building a new ward for this dispensary.

His heart was examined again on 6th November, 1935, and found normal on palpation, percussion and auscultation. The roughening of first sound, previously present, could not be detected.

(3) S., a Mohammedan male, 14 years of age, attended the outdoor department of this dispensary on 6th August, 1935, complaining of cough and breathlessness on exertion. On examining his heart, the apex beat was palpated in the fifth intercostal space in the mammary line; cardiac dullness was found increased in size transversely, and auscultation revealed a long diastolic bruit in the mitral area. The bruit terminated in the first sound; the second sound was not heard in the mitral area.

The liver was enlarged downwards; its lower edge could be felt two-finger breadths below the right costal margin.

There was no history of acute articular trouble, which might have confined him to bed, though on enquiry his father stated that pain in the legs and back had been complained of by the patient off and on for the last two years and a half.

(4) H. C., a Hindu male, 17 years of age, was admitted to this dispensary on 7th September, 1935, for swelling of the feet, legs and ascites. He gave a definite history of subacute articular pain two and a half years ago, when he got swelling and pain of the foot, knees and later other joints. Pulse count was 116 per minute, regular, volume and tension normal and equal on both sides. Cardiac dullness was increased laterally and downwards. A faint diastolic bruit was present in the mitral area; it was better heard when examined in the standing posture. He was put on tincture digitalis and intramuscular injections of salyrgan. Paracentesis abdominis had to be performed for the relief of ascites.

During the eight years of my practice in this part of the country I have treated only three cases of chorea. Two were girls, one of whom is now 11 years old. She got the attack in January 1934. Her heart was normal then. I examined her again on 3rd October, 1935, and heard a systolic murmur in the mitral area; compensation was good and the girl was healthy otherwise.

I have not come across rheumatic subcutaneous nodules so far.

I am satisfied that rheumatic fever does exist in this country area of the Punjab. McSweeny has estimated that the proportion of children showing rheumatic heart disease in Cardiff is 5.82 per 1,000 of the school population. It was found to be 7.72 per 1,000 in Bristol, as compared with 1.28 for Bath and 1.03 for Gloucestershire. It was also reported that juvenile rheumatism is a disease of towns, as opposed to country areas, and of industrial towns in particular. Perusal of the table will show that

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SIGNIFICANCE OF FLORENCE TEST FOR SEMINAL STAINS*

By RAI BAHADUR K. N. BAGCHI, B.SC., M.B., D.T.M., F.I.C.
Chemical Examiner to the Government of Bengal, Calcutta

THE choline periodide, or Florence test, for seminal stains has been proved to be of immense value in medico-legal work and adopted as a routine test in all medico-legal laboratories.

In this laboratory the seminal stains are always examined for the micro-crystals of choline periodide as well as the spermatozoa and the result is expressed in terms of spermatozoa, *viz*, positive or negative according as the spermatozoa are found or not found. Too much reliance is not placed on the Florence test on account of the fact that in certain cases with a negative Florence test spermatozoa have been detected. The reason for this anomalous finding is in some cases the washing of the garments and consequent dilution of the choline-containing substance of the semen, while a few spermatozoa which happened to penetrate into the

* Being a paper read (in modified form) at the medical section of the Indian Science Congress held at Hyderabad on the 2nd to 8th January, 1937.

(*Continued from previous column*)

it is not less common in this rural area of the Punjab than in the towns of England.

Efforts should be made to banish the idea that rheumatic fever does not exist in the Punjab. In children the onset and course of the disease may often be subacute, and thus may be frequently overlooked, if the possibility of its existence be not kept in mind. The early recognition of this destructive disease is of paramount importance in influencing its treatment. I, therefore, take this opportunity to appeal to the authorities of the Punjab Medical Department that steps be taken to circulate instructions amongst its medical officers in charge of hospitals and dispensaries to inform them of the existence of rheumatic fever in the Punjab, to put them on the alert to diagnose typical and subacute cases, and to treat them thoroughly. The replenishment of the supply of sodium salicylate should be considered as important as that of quinine or other specifics. I am sure this will result in enormous good.

Summary

A thousand outdoor cases, attending for different ailments, were examined for the existence of rheumatic endocarditis; the results are given in the table.

Four cases are reported in detail.

I am greatly indebted to Lieut.-Col. K. R. Batra for useful advice and kind permission to publish this article.

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meshes of the fabric and got entangled there were not washed out. The washing in these cases is always with cold water and without any soap as is usually done by people in the countryside during their daily bath. It may also be due to some unknown chemical changes brought about by foreign matter containing all sorts of bacteria. Whatever be the reason, the fact is there and as a result of these findings a negative Florence test alone is not considered as a confirmatory test, and a spermatozoon is always searched for in all negative cases. In cases with a positive Florence test, on the other hand, the spermatozoa have in some cases not been found in spite of painstaking searches for the same and it was therefore believed that the positive Florence reaction in the particular cases had nothing to do with semen, but was probably due to the presence of blood or pus or some other choline-containing materials which are responsible for positive reaction. But in the light of the following observations it will be seen that the significance of this test has not been properly understood and there is considerable scope for modification of the interpretation of the result.

Lately, I had an occasion to examine an absolutely fresh specimen of semen of an aspermia case in which not a single spermatozoon, live or dead, could be detected, but the choline-periodide crystals developed readily and large beautiful crystals, as obtained in normal seminal fluid, were seen under the microscope. The colour, smell and consistency and also the cellular elements of the specimen were quite normal and the man was strong and otherwise healthy. It is therefore evident that the Florence test does not depend in any way on the spermatozoa but on choline of the spermatic fluid, which contains the highest amount of choline (Fletcher *et al*, 1935). The prostatic secretion obtained by carefully massaging the prostate and avoiding the seminal vesicles as far as possible also gives a slightly positive Florence test. The choline-containing substance is therefore contained in the secretion of the testes and possibly of the prostate and the production of the crystals clearly indicates the presence of the spermatic fluid quite independently of spermatozoa.

It may however be contended that choline from other sources may cause a positive reaction but the garments which are received for medico-legal examinations exclude all possibilities of presence of any choline-containing material other than semen. Blood contains a negligible amount of choline and its presence along with semen in mixed stains does not help in producing the periodide crystals, but on the other hand interferes with the reaction and the crystals do not form in the usual course. In such cases a positive reaction is obtained with difficulty after a preliminary treatment for removal of the blood proteins (Newcomb, 1932). The fæcal stains have been found to give no positive reaction. The gonorrhœal and leucorrhœal discharges resemble the seminal stains closely and are found very often in the garments. Fresh specimens of these discharges obtained from the gynæcological and venereal hospitals were examined carefully and found to give no positive Florence reaction. Neither purulent nasal discharge nor sputum, usually found in clothes, gives any positive reaction. Under these circumstances a positive reaction may be safely taken as an indication of the presence of seminal stains only.

Cases of aspermia are of course rare, but in my experience they are not so rare as it is generally believed, and these people are quite potent sexually and are likely to be involved in sexual offences. A prolonged search for spermatozoa is therefore useless in an aspermia case, and, if the presence of spermatozoa is taken as a criterion for giving opinion as to the presence of semen as it was our practice hitherto, the opinion is obviously fallacious. The formation of choline-periodide crystals, on the other hand, indicates nothing but the presence of spermatic fluid and may therefore be taken as a true index of the seminal stains. But in view of the fact that spermatozoa are sometimes found in cases with a negative Florence reaction, a careful and prolonged search for a spermatozoon is absolutely necessary before a negative opinion is given.

Greatest care should be taken in performing the test. The concentration of the aqueous extract of the stains from the garments is an important factor and it should be borne in mind that too much dilution is always to be avoided, in spite of the fact that a solution of pure choline is stated to give the micro-crystals of choline periodide in a dilution of even 1 : 50,000. The difference in the concentration of pure solutions of choline has been found to produce a pleomorphism of the periodide crystals; as, for instance, with much diluted solution 'thin black rods', instead of the usual monoclinic forms, are obtained, while with a strong solution a precipitate of blood and dark-brown globules looking like oil-globules are formed (Booth, 1935). It has also been found that the esters of choline from the tissues do not give a positive Florence reaction, but, if an ester is hydrolysed for about two minutes with a dilute alkali (1 per cent solution of NaOH) at room temperature and then acidified with dilute hydrochloric acid, the reaction is readily brought about in suitable dilution (Booth, 1935 *loc. cit.*). The presence of an alkali also retards the reaction but the difficulty is got over by acidification with dilute hydrochloric acid. The clothes which are generally received in cases of sexual offences bear the seminal stains mixed with all imaginable sorts of filthy matter, including fæces, urine, pus, blood, gum and starch (added fraudulently to produce the

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characteristic stiffness), *pan* juice (containing lime and catechu), and mud; choline is likely to be chemically changed by some unknown factors present in some of the above extraneous materials and a positive reaction may not be obtained even in well-defined cases. The possibility of a chemical change of choline should therefore be thought of and the extracts of the stains from such dirty garments should, if a preliminary test becomes negative, be hydrolysed as a routine measure with a few drops of one per cent NaOH and then acidified with dilute HCl and submitted to the test once again. This procedure has proved useful in our hands.

Considering the ease and rapidity with which a stain is examined by this method, it is of immense value when a large number of articles are to be examined daily. A careful search for spermatozoa under the microscope is very trying and it takes an unusually long time to detect a spermatozoon in badly-preserved garments, specially during the wet months of the year when the stains remain moist for a considerable time; the garments are packed up without drying them properly and, as a result, bacterial decomposition sets in and the spermatozoa are disintegrated beyond recognition. Choline is left unaltered in these conditions and gives a satisfactory positive Florence reaction showing its value as a chemical method of detecting spermatic fluid. As time is an important consideration in laboratories where a large number of articles are examined the chemical test for detection of semen is really a great help to the analyst.

In conclusion, I would like to thank Dr. S. K. Ganguli, M.B., D.T.M., for rendering valuable assistance in the course of this investigation.

Summary

Spermatic fluid always gives a positive Florence test, which does not depend upon the presence of spermatozoa, and is obtained equally well in cases of aspermia. Gonorrhœal pus of men, leucorrhœal discharge of women, nasal discharge, sputum, fæces, etc., which are likely to be found in the garments, do not give a positive reaction. Therefore, a positive Florence test is good enough for an opinion that the stains are of semen and search for spermatozoa is useless. A negative Florence test, on the other hand, does not always indicate absence of semen, and in such cases a thorough search for a spermatozoon is necessary. Hydrolysis of the watery extract of the stains with dilute alkali and subsequent acidification with hydrochloric acid helps in some cases to produce a positive reaction by liberating the free choline. Choline periodide is pleomorphic—depending upon the concentration of the extract.

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A Mirror of Hospital Practice

CARCINOID TUMOUR OF THE APPENDIX

By M. M. CRUICKSHANK
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THE comparative rarity of carcinoid tumours of the appendix justify the report of a case presenting certain atypical features.

A girl, aged 19 years, was admitted into the hospital on 20th March, 1936, complaining of pain of ten days' duration in the right iliac fossa. The pain had commenced in the lower abdomen, had settled in the right iliac fossa, was accompanied by a feeling of nausea, but there was no vomiting. Pulse and temperature were normal and, apart from a certain discomfort on deep palpation in the right iliac area, nothing abnormal could be made out on examination.

The patient expressed herself as perfectly well and three days later left the hospital, refusing operative treatment for what was definitely a mild attack of appendicitis.

On 14th May, 1936, she was readmitted suffering from a similar attack, which had commenced the previous day with intermittent pain in the right iliac fossa, this time accompanied with nausea and vomiting. Pulse and temperature were normal and again, apart from local tenderness on deep palpation, nothing very definite was elicited.

On 15th May appendectomy was done under general anæsthesia, through a right paramedian incision.

The appendix was retrocæcal, possessed a very limited and narrow meso-appendix, was short and thick (about 2½ to 3 inches long and ½ an inch in diameter) and firm with a uniformly smooth greyish-white surface, not unlike a small sausage stuck on to the cæcal wall. The appendix was so firm right up to the cæcum that the clamp had to be placed tangentially across the cæcum rather than on the stump of the appendix, otherwise the appendectomy presented no unusual difficulty.

On cutting into the specimen it was noted that it felt hard, though not gritty, to the touch. The lumen was practically non-existent and signs of acute inflammation were not evident. The cut surface showed definite patches of yellowish colour. The specimen was sent to the pathologist, Dr. Vasudevan, to whom I am indebted for the following report:—

'The submucous tissue is markedly thickened and fibrosed and shows numerous newly-formed blood vessels with marked perivascular infiltration. There are also collections of plasma cells and eosinophiles. This cellular infiltration is also seen in the muscular and serous layers.

In another section, in addition to the changes described above, in the serous layer are seen collections of spheroidal cells arranged in groups, in places showing alveolar arrangement. A few of the cell groups are infiltrating the muscular layers but are absent in the submucous and mucous layers, and the appearance is not unlike that of scirrhus such as is seen in the breast.

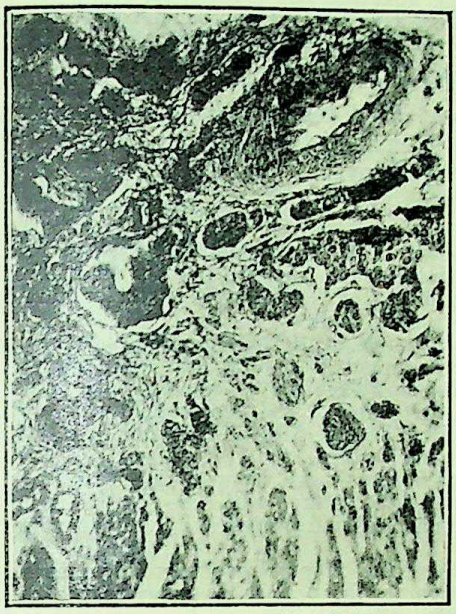
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No mitotic figures are to be seen.
A section stained by silver impregnation shows the presence of argentaffine cells.

Discussion

This specimen is peculiar in (1) that the carcinoid appearance and solid alveolar arrangement of spheroidal cells are absent from the mucous and submucous layers, but present in the serous layer, and (2) that the lesion is not confined to part of the appendix but is distributed throughout its length.



High power.



Low power.

The characteristic features of a carcinoid tumour are :—

(1) The yellowish colour of the cut surface on naked-eye examination. On cross-section a yellow ring encircles the appendix and appears to lie in the submucous coat. The yellow colour is due to a lipoid material similar to that found in the cells of the adrenal cortex and in xanthoma cells.

(2) The microscopic picture suggestive of carcinoma, *viz*, spheroidal cells arranged in solid alveolar masses usually in the mucosa and submucosa, but sometimes penetrating to the muscularis and even as far as the subserosa. The cytoplasm of the cells may be granular or may be vacuolated. That these contained granules may stain intensely with silver has raised much speculation as to the histogenesis of this type of tumour, because, while demonstrating this fact, Masson has also shown that the Kulchitzky cells in the glands of Lieberkühn in the intestine stain in a similar manner. Masson's view is that the carcinoids of the appendix and intestine arise from these Kulchitzky cells, which belong to the chromaffin system, and because of their silver-reducing property are known as argentaffine cells. These cells arise from the epithelium lining the glands of Lieberkühn and migrate as a result of some stimulus, perhaps an inflammatory process, into the nerves and become argentaffine. The age incidence of carcinoid of the appendix is early, and though invariably benign in the appendix, it is probable that all carcinoids are potentially malignant.

HÆMATOKOLPOS AND HÆMATOMETRA

By R. L. SONI, M.B., B.S., F.R.H.S.
The Soni Clinic, Paungde, Burma

M. K., a Burmese girl aged 15, had some 'colicky' pains in the lower part of her abdomen towards the evening of the 3rd September, 1935, and to relieve her she was given a purgative. Next morning she purged and while straining down noticed some blood-tinged mucus coming from her rectum. The pains continued and became worse and were associated every now and then with the expression of some blood and mucus. She was given home remedies for dysentery but she made no progress and when I saw her she had suffered continuous pain for two days and three nights.

The girl was crying out with pain, sitting on the floor with her body bent forwards and her hands clenched into her abdomen. At intervals she would sit quietly for some minutes but the pain recurred. She complained of severe persistent backache, griping pain in the abdomen and at intervals a sudden severe pain below her umbilicus and in the rectal region. She had had two somewhat similar though mild attacks, each lasting for some three days—the first two months earlier and the last three weeks ago. She had not yet commenced menstruation and there was no history of urinary retention though of late she had noticed unusual frequency.

Examination.—Nothing abnormal was detected in the abdomen except in the hypogastrium where there was a hard, rounded, somewhat tender, intra-abdominal

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swelling rising from below and extending some four-finger breadths above the symphysis pubis, like an enlarged uterus. The labia minora in their lower halves were fused together to form a bulging pouch which contained foul-smelling soft matter at the top and phosphatic concretions at the bottom. The pouch was cleared of its contents, irrigated with iodine lotion and cut open in the middle line between two artery forceps. No vaginal opening was evident nor did any appreciable bulge mark its site, but the place was tense and excoriated. Rectal examination revealed congested veins and a tense, large, globular swelling which occluded it from the anterior. The finger could easily be passed behind it but anteriorly it was obstructed some two inches from the anal orifice. No waves of contraction could be elicited on recto-abdominal palpation. The finger returned stained with blood and mucus.

Operation.—After emptying the bladder and cleaning the parts with acriflavine, under local infiltration anæsthesia the site corresponding to the vaginal opening was incised and the dissection carried up in the median line. A prominent bulge made its appearance at a depth of about an inch. Under spinal anæsthesia the bulging mass was separated all round to some depth, and this dissection was considerably helped by a finger in the rectum and a catheter in the bladder. As the dissection proceeded the mass itself protruded more and more till it almost reached the skin surface. It was desired to reinforce the recto-vaginal space, which had thinned down, but this could not be done for lack of working space, which was at this stage wholly occupied by the bulging sac. The sac was loosely stitched to the sides and punctured, and tarry odourless fluid flowed out in a stream. The flow was regulated by an artery forceps in the puncture, to avoid the danger of collapse from sudden decompression. About two pints escaped in about 1½ hours when she sweated profusely, complained of giddiness and her pulse was found to be thready. Half a c.cm. of pituitrin relieved her. The forceps were now withdrawn and the fluid allowed to ooze out unchecked.

A loose diaper was kept on and she was advised to change it frequently. Also an ergot-quinine mixture was prescribed.

Subsequent course:—

The tarry fluid continued to come out for about 20 hours and then there was a reddish flow lasting for another two days.

On the fourth day the uterus was not palpable abdominally. The vaginal wound was inflamed, the stitches had given way, and the temperature was 100°F. The lower part of the vagina was packed with gauze soaked in B. I. P. P. and the pack changed every morning for a week. Examined later the wound was found to have healed and the vagina appeared normal except for a copious white discharge. The cervix was normal and the uterus firm and in its proper place. The tubal regions were also found normal on bi-manual palpation and the bulge into the rectum was absent.

The next menses occurred after 27 days and lasted for two days. It was scanty and associated with backache. She was given freshly-prepared calcium lactate in mixture and liquor asoka and advised to take plenty of fresh vegetables, milk and fruits. The three menses that followed were somewhat irregular but for the last six periods she has been quite regular and normal.

Comment.—Cases where hæmatometra is superimposed on hæmatokolpos are comparatively rare and may be taken to be due to failure of early recognition of the condition. In this case it appears that the lower part of the Mullerian duct had failed in canalization though the remaining parts of the genital tract above it appear to have developed normally. The pouch formed by the lower parts of the labia minora is of interest, but it cannot be definitely stated whether it was a congenital malformation or the result of an acquired adhesion, though the appearances were suggestive of the former. The phosphatic concretions were most probably derived from the ammoniacal decomposition of urine.

STONE IN THE URETHRA OF A BABY

By RAMENDRA K. BASU

Civil Assistant Surgeon, Kishanganj, District Purnea

A BOY, aged ten months, was brought to me with the history that he had not passed urine for several days.

The child was in obvious distress and the bladder greatly distended and tender. The penis was erect and on palpation a hard mass could be felt near the anterior end of the urethra. Urethral obstruction was confirmed by failure to pass a fine rubber catheter further than the obstructing mass.

The child was lightly anæsthesized and the obstructing body worked forward to the meatus by external manipulation. The meatus was incised sufficiently to expose the point of the obstruction which was then removed by leverage with the single blade of a Spencer-Wells artery forceps.

The urine was drawn off with a fine rubber catheter and the meatus sutured with fine silk. The urine was turbid and was found to be heavily charged with oxalate crystals.

Next day the prepuce was very œdematous causing obstruction to the passage of urine, so the child was circumcised after which he made a complete recovery.

The foreign body proved to be a calculus the size of a black pepper, of dark brown colour, and nearly round.

I am reporting this case as it must be very rare for so young a child to develop a stone.

CALCIUM OXALATE CALCULUS IN THE URETHRA

By S. N. MITRA, L.M.F.

Medical Officer, Namdang Tea Estate Hospital, P. O. Margherita (Upper Assam)

A MALE, aged about 40 years, employed as a 'line' chowkidar, was admitted into the hospital on the 7th September, 1936, with the following symptoms:—

Frequency of micturition for one year, the quantity passed on each occasion being very small and pain and irritability of the glans penis. These symptoms had become much worse during the past four or five days. There was a slight muco-purulent discharge from the meatus and microscopical examination revealed intracellular diplococci.

A soft rubber catheter was passed and was arrested just three-quarters of an inch behind the glans penis by a hard mass which could be felt on external palpation. It was extracted by artery forceps after breaking it into four pieces and it was identified as a calcium oxalate calculus. The total size of the stone was three-quarters by half an inch, irregular, very hard, and dark brown in colour. The patient was relieved of his symptoms and no further stone could be detected either in the bladder or in the urethra.

The man has lived in the garden for over 20 years. There is no previous history of any continuous fever nor any family history of calculus. He is much addicted to drinking country liquor and chews a great deal of betelnut.

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Indian Medical Gazette

FEBRUARY

COD-LIVER OIL IN SURGERY

ABOUT three years ago Professor W. Löhr reported, at a Medical Congress at Magdeburgh, the remarkable results he had achieved during the previous two or three years by the use of cod-liver oil in the treatment of septic lacerated wounds, compound fractures, acute osteomyelitis and burns; in short in any conditions where pyogenic infection plays an important part. He first tried cod-liver oil dressings because he had formed the impression that wounds healed better in children who were taking cod-liver oil internally than in those who were not having it, and his results were so promising that he soon adopted this method of dressing as a routine treatment for practically all septic conditions. In addition to oil dressings he employed the usual surgical procedures, such as free evacuation of pus and excision of dirty wounds, before filling the cavity with cod-liver oil and covered the area by a plaster splint to ensure immobilization of the part if such were necessary. Unless there were indications for its removal, this dressing was left in place for about a fortnight without renewal.

This work of Löhr's was altogether empirical and all the explanation offered for the good effect of cod-liver oil as opposed to other oils was that it contained an unspecified 'something' which other oils lacked. Such remarkable results naturally attracted a good deal of attention and it was not long before other reports began to appear confirming Löhr's claims, and in England Steel of Liverpool gave an account of his experience in the use of this oil in treating burns and showed that the healing under dressings of cod-liver oil was much better than under tannic or picric acids, the remedies that have been considered the best for several years in the relief of these painful injuries.

So far no attempt had been made to identify specifically the active principle responsible for the healing powers of cod-liver oil, but it was a foregone conclusion that this form of treatment would not be allowed long to remain on this rule of thumb basis and that research workers would soon attempt to solve this problem, and so provide a sound scientific explanation for the facts which had been amply established by clinical observation.

Papers on this aspect of the subject have now begun to appear and among them are two in the *Lancet* of September last year. It is natural in times, such as the present, when vitamins loom so large before us that the well-known high vitamin-A content of cod-liver oil should be considered as the first possibility to be investigated. The first of the papers quoted above is by Davson at Manchester University, and as a preliminary he performed experiments to show that cod-liver oil was definitely a more active stimulant to tissue response than other oils. He injected into rabbits' ears cod-liver oil, olive oil and paraffin and it was clearly demonstrated that the tissue reaction surrounding the cod-liver oil globules was much more active and led to the production of more completely organized new tissue than in either of the controls. With the idea of finding out whether vitamin A was the responsible agent, a second series of experiments was performed using cod-liver oil and halibut-liver oil, because the latter has a much greater vitamin-A content than the former. Both these oils were used undiluted and diluted 1 in 20 in olive oil, and pure olive oil was used as a control. It was found that halibut-liver oil, with approximately one hundred times as great a vitamin-A content as cod-liver oil, was no more active than the latter either in the pure or in the diluted state. It is concluded by this worker that vitamin A is not the important factor and two other possibilities are suggested. One is that animal oils are more rapidly and completely hydrolized in animal tissues than are vegetable or mineral oils, and the other is that vitamin D, which is present in approximately equal proportions in cod-liver and halibut-liver oils, may be the active principle.

The second paper to which we have referred is by Sandor in Hungary and altogether disagrees with the above conclusions, for it is claimed that pure vitamin A without any vitamin D, and mixed in an inert base such as paraffin in the form of an ointment, is just as effective as cod-liver oil, so that Sandor and the group of workers associated with him ascribe the therapeutic value of cod-liver oil to vitamin A alone.

As is to be expected cod-liver oil or its manufactured substitute, known as vulnovitan, is being tried on all kinds of conditions. There are several reports of its value in clearing up eye infections of many kinds and in promoting the healing of indolent corneal ulcers. It is claimed that cutaneous ulcers with large granulating surfaces and no tendency to heal, under cod-liver oil after an intense cellular reaction lose these granulations and are replaced by healthy healing tissue.

The group of workers associated with Sandor report on the successful treatment of cases of surgical tuberculosis and even of gastric and duodenal ulcer. These numerous uses of cod-liver oil indicate that as a new and apparently valuable remedy for external application it most probably will be tried and possibly claimed as a cure for all the ills to which flesh is heir. We have had some small experience of this form of treatment, both in pyogenic skin diseases and

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anal fissure, and have been favourably impressed with it.

It will of course not fulfil all the expectations of the uncritical enthusiast, but there is little doubt that when its powers have been properly assessed it will be found a valuable substitute for more irritating antiseptics and will prove an important addition to our collection of external medicaments for a certain number of diseases.

Special Article

FAIRS AND FESTIVALS IN INDIA*

By R. B. LAL, M.B., B.S., D.P.H., D.T.M. & H., D.B.

Officiating Director, All-India Institute of Hygiene and Public Health, Calcutta

MAN, says Aristotle, is a social animal. We gather together for purposes of social intercourse, for celebrating fairs and festivals, for transacting business, and unfortunately also for waging wars. In doing so not only do we exchange our sentiments and feelings, our wares and our bullets, but also, unless we are particularly careful, we unwittingly exchange our respiratory and intestinal flora, and ecto-parasites. Exposure to infection in this manner starts early in life, but as we grow older our contacts in the daily round increase and the spheres of the sources of infection enlarge and we contract many a common malady. The common cold is an example. However, under settled conditions of life, partly on account of natural adjustment of the herd resistance and partly to conscious communal efforts, the evil effects of this exchange of flora are, in a civilized community, very much minimized. In large gatherings, on the other hand, all safety measures are liable to break down with dire consequences. It is under these circumstances that the technical knowledge, the administrative capacity and the resourcefulness of the public health official are taxed to their fullest extent. To escape from disastrous epidemics, therefore, we must look up to the health administrator for his thorough understanding of the problem, foresight, attention to minutest details, qualities of leadership and physical capacity on the one hand, and on the other to the confidence reposed in him by the community in the form of co-operation, investment of legal powers and provision of material resources.

The slow but steady development of international rules of health and the administrative machinery set up to enforce them have, to a great extent, banished the dangers arising out of the communicable diseases in relation to trade and travel though the increasing speed of modern transport is every day creating new problems. Again, the recent advance in military hygiene has removed the horrors of war so far as the epidemic diseases are concerned.

The problem of the management of the fairs is much more difficult to solve. The public health official possesses neither the dictatorial powers of the military hygienist, nor the material resources of the Port Health Officer. The pilgrim centres in this country draw their religious devotees in millions from all parts of the country; each individual contributes his own quota of infection peculiar to himself. His religious fervour is great, but his material resources are scanty. He is half starved and possesses but little means of protection against the inclemency of the weather. His ignorance on the one hand and the avarice of the priests and other opportunists on the other conspire to disposes him of what little he does possess. He is not used to any discipline and is in no mood to co-operate with the authorities. Besides, he finds himself in strange circumstances where he is unable and unwilling to abide by the few rules of health which he was in the habit of performing. Thus in a fair we have congregations of an undisciplined mass of humanity capable of generating a large quantum of various kinds of infection. They possess little or no resistance due to lack of previous experience of the infection or due to malnutrition, nervousness and hardship. They are huddled together under ideal conditions for the spread of the infection. It is little wonder, therefore, that fairs and pilgrim centres have acquired a notoriety in the history of epidemic diseases in this country and are justly dreaded by health authorities as starting points of wide-spread epidemics. Not only is the place of congregation the danger spot, but the nodal points along the pilgrim routes are sources of equal anxiety to the health administrators. These camping grounds or temporary abodes, where confluence of the stream of pilgrims arriving from different routes takes place, are also hot-beds of epidemic diseases. They are much more difficult to manage than the fair grounds themselves.

Epidemics of cholera have time and again been traced from the pilgrim centres, such as Hardwar, Allahabad and Puri, but many other epidemic diseases, less dramatic in their manifestations and more difficult to trace, must also arise in connection with the fairs. Records are

*Being a lecture delivered at the Public Health Society, Calcutta, on the 18th December, 1936.

We hope to publish a similar lecture on some public health subject each month during the year.—EDITOR, *I. M. G.*

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full of such happenings. It is, however, not my intention to dilate on this point, but the history of cholera in the Punjab in relation to the Kumbh and the Adha-Kumbh fairs at Hardwar is a clear demonstration of the rôle of the festivals in the causation of this epidemic disease. Similarly, at Allahabad, each and every gathering at the time of the Kumbh and Adha-Kumbh from 1882 to 1918 was accompanied by a great rise of cholera incidence in the eastern districts of the United Provinces, Bihar and Orissa, and the Central Provinces. The Ratha Jatra fair at Puri, Sinhast fair at Nasik and Godavari, Puskaram fair at Rajamundry, Krishna Puskaram at Bezwada, Mahamakshan fair at Kumbhakonam and Sagor Mela in the Sundarbans occupy no less enviable position in relation to cholera epidemics. Some of the epidemics in connection with these fairs have led to world-wide epidemics. It must, however, be remembered that it is not only these mammoth gatherings which are sources of danger, but, as the pilgrim committee of Madras have rightly pointed out, the smaller festival centres in out of the way places are of no less importance.

The festival centres may conveniently be divided into :—

(*a*) the places of perennial pilgrimage, and
(*b*) temporary camps specially erected for periodical fairs and festivals.

The former possess some special religious sanctity apart from the occurrence of holy days. They continually attract pious people from different places. Kalighat, Benares, Puri, Rameswaram and many others may be cited as examples of such centres. The latter type of centre comes into prominence only on certain days in the year and, more particularly, periodically after a number of years. The attractions to these places are as much secular as religious. Kumbhs and Adha-Kumbhs at Hardwar and Allahabad are the best examples. Ardhodaya Joga festival on the Ganges and the Sagor Mela, the Puskaram fairs along the bank of the Godavari and Krishna are also similar in nature. Names of some of the important fairs held in different provinces along with average number of persons attending them, the time of the year when they are held, and the duration of the festivals are shown in the annexed table which may be of interest.

Control measures

Although the importance of the fairs in the spread of infection, particularly of cholera, was recognized long ago, it was only in recent years that earnest attempts were made to control them. People were used to looking upon these happenings as inevitable and the magnitude of the problem used to scare away the not-over-enthusiastic health officials. Even such a forceful personality as Sir Leonard Rogers once considered the sanitary control of fairs too stupendous a task to be attempted with any chances of success. Thus, for a long time the custodians of the health of the people totally ignored the occurrences of the fairs. Dr. C. Plank, then Sanitary Commissioner of the United Provinces, for example, was unaware of the occurrence of the Kumbh fair, held at Allahabad in 1882, until he noticed a large number of people travelling by road to the fair grounds on the south-west of the city. The first determined attempt to move in the matter may be seen in the Puri Lodging House Act of 1871 which is in fact the precursor of the Bengal Municipal Act of the present day. Earlier attempts were mainly in the nature of medical treatment of minor ailments amongst the pilgrims. The medical subordinates who were deputed to these duties were neither capable nor properly equipped to cope with any serious outbreak of infectious disease. Up to the beginning of the present century the state responsibility in the control of the infectious diseases at the pilgrim centres was only partially recognized and it was left mainly to the local authorities to do what they could in the way of sanitary control of fairs. Sanitary inspectors were put in charge of public health organizations at the fair grounds and their efforts usually ended in complete failure. Apart from the insufficiency of funds and the lack of expert direction, the main reason for these failures was that no attempt was made to control the nodal points. Meanwhile the epidemic diseases continued to play havoc with the pilgrims. Pilgrim committees were then appointed in Madras, Bihar and Orissa, Bombay, United Provinces, etc., and their reports were forwarded to the Government of India in 1916 by the Sanitary Commissioner with the following remarks :—

Medical arrangements on railways :—

Along all the main lines there should be properly appointed stations where patients must be removed if suffering from any infectious disease. They should not be removed at places where no facilities for treatment exist. On the whole, all the pilgrim committees consider that the railway should be responsible for removing the patients and sending them to the hospital, but it is advisable to have the hospitals under the local civil authorities.'

This was the beginning of the suggestion of the much-needed joint action by the various public health authorities. The decentralization of sanitary services effected by the Reforms Act of 1919 threatened to kill this germ of joint and organized action by different provinces and other bodies responsible for the health of the people. Luckily, however, the provincial public health departments recognized the importance of joint action and successfully extended this principle to certain fairs of all-India importance. How successful such a policy has proved to be is best illustrated by the brilliant achievements

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at the Kumbh and Adha-Kumbh fairs held at Allahabad in 1930 and 1936 respectively. I attended the Adha-Kumbh fair held early this year at Allahabad, and a short account of this fair will, I think, be of interest.

A fair is held annually at the confluence of the Jumna and the Ganges south of Allahabad, during the months of January and February. It assumes special importance every 12 years when it is known as the Kumbh fair. In between two Kumbhs, Adha-Kumbh fairs are held which are somewhat less important than the former and usually attract a smaller number of people. Thus the Kumbh and the Adha-Kumbh alternate at an interval of six years. The 1936 Adha-Kumbh began on Puranmashi day on the 8th January and lasted for one full month up to the next Puranmashi, *Makar Shankrant* on the 14th January, *Amawasya* on the 24th January and *Basant Panchami* on the 28th January were the chief bathing days on which the expected number of bathers were estimated as 200,000, 1,500,000 and 500,000 respectively. Actually, however, a much larger number visited the fair. The resident population in the *mela* area was expected to be in the neighbourhood of 30,000 on *Makar Shankrant* and 50,000 on the *Amawasya*.

For the sake of convenience the public health arrangements may be divided into three parts :—

(1) Prevention of importation of infection into the *mela* area and the control of nodal points in connection with the incoming pilgrims.

(2) Sanitary control at the fair grounds.

(3) Prevention of the spread of infection through the returning pilgrims.

To ensure the co-operation and joint action by the public health services of the adjoining provinces and of the railway authorities a joint meeting of the Directors of Public Health of the Punjab, United Provinces, Bombay, Central Provinces, Bihar and Orissa, and Bengal and of the Chief Medical Officers of the E. I. Railway, B. & N. W. Railway, and G. I. P. Railway is held a few months before the fair. Arrangements are made to draw the attention of the intending pilgrims to the dangers involved in proceeding to the fair. They are induced to get themselves inoculated against cholera before leaving their homes. Arrangements are made at important railway stations in their own provinces for medical inspection before the pilgrims entrain for Allahabad. Similar arrangements are also made for medical inspection at boundary stations and at stations *en route, viz,* Moghalsarai, Kashi, Benares, Benares Cantonment, and Ajodhya, and also at stations in Allahabad, *viz,* Allahabad Junction, Allahabad Sangam, Prayag, Prayag Ghat, Phaphamu, Allahabad City, Izat Bridge and Jhusi.

At Moghalsarai, Jhusi, and Phaphamu eight, four, and one cholera beds, respectively, are provided in huts specially erected for the purpose with the object of segregating the pilgrims found to be suffering from cholera. Four additional smallpox beds are provided at Moghalsarai. The patients detrained at other railway stations are removed to the nearest municipal infectious diseases hospital, the railway infectious diseases hospital at Naini or the special infectious diseases *mela* hospital, as the case may be. For pilgrims travelling by road arrangements for the detection of cholera and smallpox cases and their detention in suitable hospitals are made at Jhusi on the Grand Trunk Road, at the junction of Grand Trunk Road and Fort Road, at the bund near the Mori-Daraganj and at the junction of the Bund and the Tribeni roads near the carriage stand. A party consisting of a medical officer, a peon, two vaccinators and one sweeper is posted at each of these places. A supervising medical officer is also appointed to maintain these services efficiently.

The district boards of Allahabad, Fatehpur, Jaunpur, Pertabgarh, Mirzapur, Benares and Faizpur are made responsible for the repairs of roads, camping grounds, wells and tanks situated within their jurisdiction. The wells are disinfected before the commencement of the *mela* and this service is repeated as often as necessary. At the recommendation of the Director of Public Health grants-in-aid are given by the Government to these boards for the improvement of the wells. The municipal boards of Allahabad, Benares, and Faizabad are asked to augment their medical and sanitary staff and enforce sanitary measures in connection with the temporary camping grounds for pilgrims within their limits. Special attention is paid to the prevention of over-crowding and to the provision of proper sanitary arrangements in the *sarais* and other lodging houses. A watch is kept for the detection of cases of infectious diseases.

The *mela* area consists of the beds of the two rivers. It is a triangular piece of land, the base of which is formed by the Fort Road, and the two sides by the Jumna and the Ganges. The Izat Bridge on the Ganges and the Jumna Bridge form the upper limits and a point half a mile below the confluence of the rivers the lower limit within which they are under sanitary control. Jhusi village across the Ganges and Arail on the other side of the River Jumna are also included in the *mela* area. Soon after the rains this area is cleared and laid out for the *mela*. It is divided into five sanitary circles :—

Circle I the area above the bund.
„ II Ganga Patti.
„ III Jumna Patti.
„ IV Jhusi.
„ V Arail.

The central road, which is the continuation of the Tribeni Road, separates the Ganga Patti from the Jumna Patti. Each circle is laid out into small square or oblong plots surrounded by cross roads. In circle I, general offices,

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exhibitions, *sabha pandals* and parking grounds are located while in the other circles plots are allotted to different parties of pilgrims, the requirements of the bigger parties and *akharas* having been ascertained beforehand.

Conservancy.—Public latrines are provided in the form of trench latrines which after use are filled in with mud and a layer of lime over which is placed a covering of gunny bag soaked in tar. Additional clay is heaped up and painted white to prevent persons from trampling over them. Each trench is 72 feet long, 1 foot wide, and 4 feet deep and accommodates 24 seats. Two hundred trench latrines in 40 sets of 5 each are provided yielding a total of 4,800 seats. To prevent caving in of the walls planks of wood are laid on either side of the trench. They also act as foot-rests. Private latrines of similar type are permitted in special cases. A hydrant is fixed near each trench. Sweepers are in attendance at all latrines to keep them clean, to fill up the used ones, and to dig new trenches. The trench latrines answer the purpose very well and are quite popular except with a certain sect of *sadhus* who refuse to use them. For this group enclosures known as 'flagged areas' are provided from where excreta are collected by sweepers and removed to the nearest trenches. No promiscuous defiling of the grounds is permitted. This is accomplished with the help of sanitary police.

Four hundred urinals are provided in suitable places. They consist of small enclosures in which an oblique funnel-shaped tube is buried in the ground, the lower end of which opens in a soakage pit.

Rubbish and garbage are collected by the conservancy staff and deposited in dust-bins placed at suitable locations. The contents are removed to rubbish pits, 60 of which had been provided. The final disposal is effected by burning on the spot. A quicker disposal of rubbish could probably be accomplished by providing tubular openings at the bottom to act as under-drafts.

With the sacred bathing, the ceremony of shaving the head is linked up. This operation is permitted only in a special enclosure, known as *Naibara,* where sweepers are detailed for collecting the hair in gunny bags and removing it to boats for dumping in the river at some distance down the confluence. Special *domes* are engaged to remove the animal corpses and unclaimed dead bodies for disposal. The cremation is performed at the *ghats* on the bank of the Ganges.

Water supply

Water is derived from two deep tube-wells which are permanent constructions above the *bund:* each yields 2,500 gallons per hour. The water is stored in an overhead reservoir from which it is distributed throughout the area, particularly along the banks of the river.

Medical relief

A large area on the Jumna Patti is enclosed to house the main hospital for general diseases. The outdoor department is situated on the main road. Altogether 90 beds are provided, 20 of which are reserved for women and 10 for the police force. The indoor accommodation takes the form of small isolated huts accommodating four beds each. This arrangement is cumbersome from the administrative point of view, but it has been adopted as a precautionary measure against an outbreak of fire—the huts being made of dry hay stalks and bamboos.

An outdoor dispensary is also provided for the use of the police force in circle I.

A similar 90-bed hospital is located in the Ganga Patti. This serves as the infectious diseases hospital. A Servian-barrel disinfector has been set up in the compound. Exposure to cold winds is, however, likely to reduce its efficiency. Only three cholera cases were admitted into this hospital during the fair. A camp laboratory is attached to this hospital.

Besides the two main hospitals there are two branch hospitals at Jhusi and Arail. The former consists of four beds for infectious diseases and four for general diseases. At Arail there are only six beds, two being reserved for infectious diseases.

Ambulance services have been provided.

Voluntary aid.—Sewa Samity provides first aid and arranges to remove the patients to the hospital. Three dispensaries have been opened by voluntary agencies where free treatment is given.

Light.—Electric light has been supplied throughout the *mela* area. This is a great improvement on previous *melas* inasmuch as it reduces the chances of fires and greatly increases the efficiency of the conservancy staff and the sanitary police.

Dust nuisance.—Adequate arrangements have been made for watering the roads and there is no dust nuisance.

Public health propaganda.—Advantage has been taken of this gathering for purposes of public health education. An extensive and attractive exhibition has been organized by the Assistant Director of Public Health Propaganda. The model demonstrating the efficiency of quinine in malaria is particularly impressive. Many lectures on public health topics are broadcasted by the aid of a megaphone. Cinema films are shown at night. A film describing the Pertabgarh Health Centre is particularly interesting. These films attract large crowds who have to sit there for hours. There is a possible danger of exposure to cold in the open *maidan* where these demonstrations are held.

General administration

An Assistant Director of Public Health is in general charge of the sanitary and medical arrangements. He possesses extensive powers

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List of important fairs and festivals in India (by provinces)

Serial number	Province.	Name of the fair	Locality	Permanent or temporary	Number of persons attending	Interval at which held	Duration	REMARKS
1	Bengal	'Shivaratri' festival.	Tarakeswar, Dist. Hooghly.	Permanent	30,000	Yearly	2 days	
2	„	'Rathajatra' festival.	Mahesh, Dist. Hooghly.	„	100,000 to 250,000	„	15 „	
3	„	'Gangasagar' *mela*.	Dist. 24-Perganas.	Temporary	50,000	„	3 „	
4	„	'Astami Snan'	Nangalbundh, Dist. Dacca.	„	40,000	„	4 „	
1	Bihar and Orissa.	'Ratha Jatra' festival.	Puri	Permanent	300,000	„	9 „	
2	„	'Pitripaksh' *mela*.	Gaya	„	200,000	„	18 „	
3	„	'Kartick Asnan' fair.	Sonepur, Dist. Saran.	Temporary	400,000	„	14 „	Claimed to be the largest cattle fair in the world.
1	United Provinces.	'Dikhauti' fair.	Hardwar	„	300,000 (in 'Kumbh' years).	„	14 „	'Kumbh' and 'Adha-Kumbh' at usual intervals.
2	„	'Magh' *mela*	Allahabad	„	3,000,000 (in 'Kumbh' years).	„	One month in 'Kumbh' years.	
3	„	'Dadri bathing' festival.	Ballia	„	400,000	„	2 weeks	
4	„	'Garhmukhteswar' fair.	Dist. Meerut	„	..	„	..	
5	„	'Savan Jhula' fair.	Ajodhia	..	..	„	2 weeks	
6	„	'Ram Naumi' fair.	„	..	..	„	..	Occasional fair.
7	„	..	Benares	Permanent	..	..	..	
8	„	..	Muttra and Brindaban.	„	..	..	..	
1	Punjab	'Kata's' fair	In the salt range.	Temporary	50,000	„	..	
2	„	'Sun eclipse' fair at Kurukshetra.	Thaneswar	„	500,000	..	..	A periodical event, occurring at the time of a partial or complete eclipse of the sun.
3	„	'Phalgu' fair	Dist. Karnal	..	100,000	..	..	
4	„	'Guru Nanak' fair.	Nankana Sahib	..	100,000	..	..	
1	C. P. and Berar.	Mahadeo Cave fair.	Panchmari Hills.	..	100,000	..	..	Total of 118 fairs in C. P.
1	Bombay	'Sinhasta' fair	Nasik	Temporary	1,000,000	12-yearly	13 months	One of the four 'Kumbh' centres.
2		'Ashidi' fair	Pandharpur	..	143,000	Yearly	..	
1	Madras	'Godavari Pushkaram'.	Rajahmundry	Temporary	1,000,000	Periodical	20 days	All these are 12-yearly festivals but come off together within 12 to 15 months of each other.
2	„	'Kistna Pushkaram'.	Bezwada	„	„	„	12 „	
3	„	'Mahamakham'	Kumbakonam	„	„	„	1 to 2 days	
4	„	„	Rameswaram and Tirupati.	Permanent	..	..	..	

under the Indian Epidemic Diseases Act, 1897. He is assisted by a deputy and by medical officers in charge of circles. Special medical officers have been detailed for hospitals, field laboratory and supervision of arrangements at the railway stations in Allahabad. The medical

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officers in charge of the circles are assisted by vaccinators, jamadars, beldars, mates, and menials in the discharge of their duties. Besides proper maintenance of the sanitary condition of their areas, these officers are responsible for the detection of cases of infectious diseases and their removal to the hospitals.

I have tried to give you a brief sketch of the medical and sanitary arrangements made at the Adha-Kumbh *mela* held in January and February 1936, but an adequate idea of the success of these measures can only be obtained by a personal visit. The standard of general cleanliness is very much higher than in an average Indian town. Flies are conspicuous by their absence. The danger of extension of an epidemic is reduced to a minimum. The pilgrims feel safe and comfortable. These fairs may, in fact, be looked forward to an occasion for physical and mental rest as much as a source of spiritual gain. This is no mean achievement. Rai Bahadur Dr. K. P. Mathur, the present Director of Public Health, United Provinces, who as Assistant Director was in charge of the sanitary and medical arrangements of the fair, is to be congratulated on his successful administration and also his staff.

Time does not permit me to dwell on the sanitary arrangements at a centre of perennial pilgrimage but what I have said is enough to show how much can be accomplished in the way of saving human life and enhancing the happiness of the masses under most difficult circumstances, if only an earnest attempt is made under suitable direction, and the community places sufficient funds of goodwill and material resources at the disposal of public health authorities.

Medical News

THE SOCIETY FOR THE STUDY AND PROMOTION OF FAMILY HYGIENE INCLUDING SEX HYGIENE

THE Society for the Study and Promotion of Family Hygiene gives training in practical contraception to doctors and nurses who are members of the society. The fees are Rs. 25 for doctors and Rs. 15 for nurses in addition to the membership fee of Rs. 12 a year.

The society has also for hire to medical groups three cinema films on the technique of birth control including demonstrations on a living subject, the hire charges being Rs. 50 only.

For particulars apply to the General Secretary, Kodak House, Bombay 1.

PRESIDENTIAL ADDRESS TO THE BENGAL PHARMACEUTICAL ASSOCIATION

GENTLEMEN,

It is my duty in the first instance to express my appreciation for the honour you have done me by asking me to be your president for the second time during these few years. My duties at the School of Tropical Medicine make such a heavy demand on my time that I felt considerable hesitation in accepting it. My interest in the question of organization of the profession of pharmacy in India has, however, prevailed upon me once more to accept your offer. At the same time I cannot help feeling that perhaps someone with more leisure could have been found who would have done justice to the duties and responsibilities connected with this office at a time when important changes are taking place in order to lay the foundation for a profession of pharmacy in India. For my part, I can assure you that so far as it lies in my power, I will, with your co-operation and help, do my best to further the interests of the association.

It is with a sense of deep sorrow that I refer to the untimely death of Mr. H. Cooper. A member of the Pharmaceutical Society of Great Britain, engaged in manufacturing pharmacy in India for well over a decade, Mr. Cooper was genuinely interested in the uplift of the pharmaceutical trade, profession and industry in this country. At my request he undertook the onerous duties of guiding the destinies of the Bengal Pharmaceutical Association during the first year of its existence. At this formative stage when the Association needs guidance from a pharmacist of mature experience and ripe judgment, such as Mr. Cooper could give, his death is most unfortunate and regrettable. I feel it as a personal loss, as he was not only a friend but a member of the Drugs Enquiry Committee over which I had the honour to preside a few years ago. Before that he was also associated in the work the School was doing in connection with the important problem of investigation into the drug resources of India. We deeply regret his loss and offer our sincere and respectful condolences and sympathies to Mrs. Cooper in her bereavement.

The root of the evil

In 1934, when I was elected your president, I had the honour of presiding at your annual meeting in this very hall. Your association was called the 'All Bengal Compounders Association'. You decided at that time to change the name to 'Bengal Pharmaceutical Association' and this change of name brought with it a significant change in the activities of the association, that was undoubtedly a move in the right direction. Though at the present time no organized and self-contained profession of pharmacy is in existence in India as in other civilized countries, during the last two years there has been unmistakable evidence of an urge on the part of the association to improve the existing conditions. The evidence produced before the Drugs Enquiry Committee regarding the character and quality of the work turned out by the profession as a whole in this country was far from being complementary, as you are all well aware. The committee, after careful consideration, came to the conclusion that two things accounted for the regrettable state of affairs which existed—firstly, the lack of educational qualification of those who took up the profession and, secondly, the absence of restrictive laws preventing the practice of the profession by unqualified persons. These were the root of the evil. The committee considered that if something could be done to effect improvement in these two directions, pharmacy as a profession would be lifted from the deplorable condition in which it found itself and would be able to take its proper place by the side of the honourable and dignified profession of medicine in this country.

Training of the pharmacists

During the last few decades considerable changes have taken place in the practice of the profession of

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medicine. Knowledge of medicine has made enormous and rapid strides and this is reflected in the medical curriculum of the present day. The medical profession in India has tried to move with the times and has embodied and incorporated much that is necessary to build up a generation of professional men equipped to carry on the modern teaching and practice in its various branches. That is the reason why the medical profession in this country has held its place. Unfortunately the same cannot be said about the profession of pharmacy. In order to build up a profession in the true sense of the word, the first and perhaps the most essential prerequisite is training of its members. Both 'medicine' and 'pharmacy' are professions which aim to serve the public and 'to serve well' should be the keynote of both. The profession of medicine has attempted to move, as far as possible, with the changing conditions. The profession of pharmacy has lagged behind, through no fault of its own perhaps. That is the reason why it is in such a deplorable condition in India to-day. Pharmacy is intimately related to medicine and it may be said without contradiction that the practice of pharmacy is an integral part of the practice of medicine. One cannot make much headway without the other going ahead also. The present position is therefore untenable.

It is essential, therefore, that the training of the pharmacist should be improved to enable him to discharge in a full measure the responsibilities attached to his profession. He should equip himself to take his place side by side with the members of the allied profession. In Great Britain, United States of America and in many countries on the Continent of Europe, an elaborate and efficient training is enjoined before anybody is allowed to practice the profession of pharmacy. Such an elaborate system would be ideal if it could be transplanted here *in toto*. But like all ideals, it should be approached with caution. The conditions in India are vastly different and modified methods are needed to cope with the situation as it exists in this country. With full realization of all these difficulties, the Drugs Enquiry Committee worked out a suitable curriculum for adoption in India and I am glad that this association has fully supported it and has made admirable attempts to see that these suggestions are given effect to at the earliest opportunity. Your representations have borne fruit and in Bengal, at any rate, the Governing Body of the State Medical Faculty have accepted the improved curriculum and it is now before the Government of Bengal for approval. I have every hope that this curriculum, which involves a training for two years, would be found suitable and will be put into practice in the near future. As time goes on and more specific demands arise, the provisions are elastic enough to incorporate other important and significant alterations and additions.

The basic qualification and curriculum

You will all agree that a preliminary basic qualification is necessary in order to provide a basis for scientific studies. It is essential therefore that an intending pharmacist should have this basic knowledge and to enable him to do this he should possess a matriculation certificate or an equivalent qualification before beginning his professional studies. The first year should be spent in the study of elementary botany, physics, chemistry both inorganic and organic and pharmaceutical arithmetic. There is always the danger of teaching too much or too little and it is difficult to set up the exact standard. To avoid these difficulties, definite courses have been presented which will avoid confusion and meet with the requirements. In the second year's course, along with other important subjects, a course in elementary pharmacology is included. So long as it was thought dangerous to teach the pharmacist anything of the sciences on which medicine is based, so long was the pharmacist placed in a ridiculous position. It is impossible for any man to carry on his work intelligently unless he knows its purpose. It is therefore impossible for the pharmacist to prepare and dispense medicaments intelligently unless he knows something of their nature, action and use. Recent advances in materia medica have made the truth of this statement indisputable. If the pharmacists are to discharge their duties properly they must have the knowledge to understand the principles underlying the manufacture of medicaments used in modern medicine. The days of compounding simple mixtures and of making elegant preparations by addition of flavouring agents are gone and, if pharmacists wish to keep abreast of the times, they must keep in touch with the rapid advances in medicine and pharmacology. Pharmacy should supply the knowledge concerning drugs and preparations required in medical and veterinary practice and it should move on with the new orientation of therapeutics.

Legislation—'Pharmacy and Drugs Law'

So much for the curriculum and training. But improvement in the standard of training and qualification will not be effective in the absence of restrictive laws controlling the exercise of the profession. If the properly qualified pharmacist is not protected from charlatans, it is feared none will care to enter the profession seriously and face the unfair competition. What is the present position with regard to this? Those of you who were present at the annual meeting two years ago will remember that I laid great stress on the fact that the legislature in this country has not passed any act dealing with pharmacy. The Indian Poisons Act, the Opium Act, and the Dangerous Drugs Act only partially control the manufacture, sale, possession and import of certain drugs, but have no relation to the practice of pharmacy. They do not ensure that persons selling or keeping open shops for retailing, dispensing or compounding of poisons and narcotics should possess a competent knowledge of their business. In a few provinces chemists' shops are obliged to employ qualified compounders for compounding, dispensing and selling drugs under provisions of the Municipal Acts, but in most of the provinces there are no regulations whatever. In those provinces where Municipal Acts are in existence provisions requiring the registration of shops for sale of drugs and prohibiting the practice of the profession by unqualified persons are included. In actual practice, however, the machinery to see that the provisions of these acts are enforced is very inadequate and the actual state of affairs is not much better than the provinces where there is no enactment.

Quality of drugs in the Indian market, and drug industry

There is also no legislation to control the quality of drugs; the result is that the market in India is flooded with drugs and chemicals of defective strength and impure quality by unscrupulous traders and that potent remedies such as organo-metallic compounds, sera and vaccines are being freely sold without their quality having ever been tested. It is well known that certain firms abroad manufacture cheap and inferior quality drugs specially for the Indian market and are able to undersell the local manufacturers of drugs in this country. This dumping of drugs of inferior quality has its repercussion on the quality of drugs manufactured in India in that the quality is deteriorated to keep pace with the competitive rates of dumped goods. A class of manufacturers has arisen who make and sell inferior and sometimes absolutely inactive products. This substitution of genuine medicinal products by rubbish has now reached a very serious stage and is a source of grave danger to the country.

I consider that it is the duty of an association like this to press for the necessary legislation as this question is intimately connected with the question of the organization of the profession of pharmacy in India.

Need for co-operation and self-help

Legislation is necessary but is not the only essential factor. A proper understanding and due regard for

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the rights of everybody concerned are quite as important; these will act as stimuli and as correctives and will promote friendship and better service. Laws should be the expressed demands of the people as a result of interest and study of existing general good. If confidence, co-ordination and co-operation are ensured among the members of the profession the rest will follow. By improving your training, you will be able to bring better understanding amongst yourselves, and protective legislation is bound to follow in due course.

It has often been said that unless there are legal restrictions to protect the qualified pharmacist from being subjected to the unfair competition by unqualified persons, few people will care to enter the profession. A distinctive training would naturally require a distinctive treatment and, if such treatment is not forthcoming, disappointment will be the inevitable result, leading perhaps to a breakdown of the ethical standards by which alone the profession should be guided. While I fully realize the difficulties, I am one of those who believe that qualified pharmacists will be able to hold their own even without any protective legislation. As I have outlined in the Report of the Drugs Enquiry Committee legislation should have an all-India scope and should apply uniformly to all the provinces in India. Such an extensive legislation may take time. The only way to hasten the issue is to make the legislators and the public opinion in the country feel the sphere of usefulness of the profession of pharmacy. This can only be achieved by radically reorganizing the profession by improving the training of the pharmacist and fostering a spirit of service to humanity.

Drugs Control Laboratory

You are no doubt aware that the Government of India in consultation with the provincial governments have recently decided to open a Drug Control Laboratory at the All-India Institute of Hygiene and Public Health for the control of spurious drug traffic. This is the direct result of the recommendations set forth in the report of the Drugs Enquiry Committee. The establishment of this laboratory is bound to have a far-reaching effect on the profession of pharmacy in general and the drug trade in particular. By creating an effective check on the spurious drug traffic which is glutting India at present, it will exert a wholesome effect on the profession. May I venture to suggest that the present time is the most opportune for putting your house in order and for coming forward with all the help that the resources of your association can command to make the working of this unit a success. With machinery for drug control in working order, one may confidently hope that the medical profession and the public will derive immense benefit. The pharmaceutical profession, trade and drug industry will be gainers to a very considerable extent.

The future

I will not take much more of your time by going into details of many of the minor aspects of the profession of pharmacy. I have tried, in the short time at my disposal, to bring to your notice the most crying needs of the profession as it stands to-day and the means by which improvement can be effected. I have laid stress on the question of improving your training. There are some who will ask whether an improvement in training will add to a pharmacist's earnings. Will a more extended and more expensive training covering a period of two years give the pharmacist a professional income commensurate with the time and money spent on it? It may be argued by some that, after all, a pharmacist's function is to compound and not prescribe; why then should he bother about a more comprehensive training? My answer to that is that improved training will certainly bring about improvement in the avenues open for employment and will result in increase in wages. You have only to follow the progress made by the profession of pharmacy in the Western countries to see the truth of my assertion. If one pays a visit to the centres of drug manufacture in Great Britain, Continental countries and the United States of America, one at once realizes what large openings there are for the pharmacists. The pharmaceutical industry is now making headway in India and there are bound to be openings, which will go to the pharmacists if properly trained and qualified persons are available. There will be demand for the service of trained pharmacists in hospitals, dispensaries and other public institutions all over the country. Pharmacists are being recruited in increasing numbers in the army and navy and efforts to increase their representation in the various government services are meeting with encouragement both in the United States and in Great Britain. That is bound to come in this country in the near future. The future of pharmacy in India, therefore, if it can be lifted from its deplorable position, is bright and there is no reason for a pessimistic outlook. The existing problems may be serious but are not of a nature which cannot be remedied by intelligent co-operation and self-help and genuine desire for the improvement of the status of the profession. The pharmacists should bear in mind that efficient service to the public should be their prime consideration and motto. It is reassuring to see that there is already evidence of greater interest and I believe that within the ranks of this association there are men with ability, courage, foresight and breadth of vision, who will help to solve the existing problems leading to the uplift of the profession and will cope with any which may arise in future.

R. N. CHOPRA, C.I.E., M.D., M.R.C.P.,
BREVET-COLONEL, I.M.S.,
Honorary Physician to H. M. the King.

THE TINNEVELLY DISTRICT MEDICAL ASSOCIATION, PALAMCOTTAH (AFFILIATED TO THE INDIAN MEDICAL ASSOCIATION)

Health exhibition

UNDER the auspices of the Tinnevelly District Medical Association in connection with its monthly meeting at Koilpatti, on Sunday, 20th December, 1936, a health exhibition was arranged at the Loyal Mills, Koilpatti, for the benefit of the labourers and staff and their families. This was the first time a health exhibition had been held at these mills.

Lieutenant-Colonel T. S. Shastry, I.M.S., the president of the association, welcomed the visitors and explained to them the prevalence of infectious diseases such as cholera, smallpox, and tuberculosis, and how to prevent them. Dr. Beema Singh of the Ramnad District Medical Association explained in easy Tamil the gist of what Lieutenant-Colonel T. S. Shastry said in English, and elaborated on 'Birth Control' which is very necessary for the working classes.

Lieutenant-Colonel T. S. Shastry, I.M.S., then requested Mr. Ashworth, the manager of the mills, to kindly open the exhibition. Mr. Ashworth, in declaring the exhibition open, said that such exhibitions are very useful and instructive to the masses and encouraged his staff to take interest in their own sanitation, thereby promoting efficiency of work.

This was very much appreciated by the large gathering of about 400 mill workers and school children.

Monthly meeting

The Tinnevelly District Medical Association held its monthly meeting on Sunday, 20th December, 1936, at the Government Training School, Koilpatti. Members numbering 25, including two women doctors, were present on the occasion. Seven members of the Ramnad District Medical Association were also present (as guests).

After tea, the meeting began under the presidentship of Lieutenant-Colonel T. S. Shastry, I.M.S., at 6 p.m. The secretary read the minutes of the monthly meeting held at headquarters on the 21st November, 1936, which were passed.

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The following interesting clinical cases were demonstrated:—

(1) A case of long-standing fæcal fistula, due to unoperated strangulated inguinal hernia.

(2) A case of osteomyelitis, great trochanter, in a boy.

The following specimens were shown:—

(1) A case of dermoid cyst of ovary.

(2) Fibroid uterus (suspicious of malignancy).

The notes on the (1) fæcal fistula and (2) osteomyelitis cases, operated on by Lieutenant-Colonel T. S. Shastry, I.M.S., at the Government Headquarters Hospital, Palamcottah, were read out by Dr. P. S. Srinivasan, L.M.P., sub-assistant surgeon of the hospital.

Dr. Miss A. Lazarus, L.M.P., read out case-notes on (1) ovarian dermoid and (2) fibroid uterus, which were operated on by Lieutenant-Colonel T. S. Shastry, I.M.S., at the Government Women and Children Hospital, Vannarpet.

The above four cases were fully discussed by the members. Then, the president explained in detail the clinical examination, differential diagnosis and operative technique of all the cases. Then he thanked the headmaster of the school for placing the school halls at the disposal of the association for holding the meeting. He also thanked Dr. T. R. Ramachandran, L.M.P., for the excellent arrangements.

THE PARKES MEMORIAL PRIZE, 1936

MAJOR E. F. W. MACKENZIE, O.B.E., M.C., Royal Army Medical Corps, has been awarded the Parkes Memorial Prize for his investigations into the ammonia-chlorine process of water purification in the field, coupled with research carried out by him in connection with food supplies in India. By this work Major Mackenzie has achieved much in the advancement of military hygiene.

The Parkes Memorial Prize is awarded annually to the officer who is considered by the committee to have done most to promote the advancement of naval or military hygiene by professional work of outstanding merit, and is open to medical officers of the Royal Navy, the Army, and the Indian Army, with the exception of the professors and assistant professors of the Royal Naval Medical College, Greenwich, and of the Royal Army Medical College, London, during their term of office.

THE WAR OFFICE,
LONDON, S.W.1.

22*nd December*, 1936.

Current Topics

Prognosis in Leprosy

By E. MUIR, LL.D., M.D.

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THE IMPORTANCE OF PROGNOSIS

LEPROSY is not a fatal disease. The patient dies from complications and neglect rather than from the disease itself. It is perhaps because of this non-fatality, and because the patient is afraid that he may be doomed to long years of suffering, perhaps more mental than physical, that he so much fears leprosy. He has heard of, or perhaps seen, lepers in their more repugnant forms. The word 'leper', or its equivalent in other languages, is associated with the last degrees of degradation and abhorrence. In India it is called 'the great disease'. The public and even the medical profession are unaware that leprosy may be a very mild disease, and that even without special treatment many cases recover completely.

Because of all these facts, a reliable prognosis is perhaps of more importance than in most other diseases. In many diseases the infecting organism varies in virulence under certain circumstances, such as repeated and rapid passage from host to host. There is no reliable evidence that the virulence of *B. leprœ* varies in this way. The two important factors to be estimated in making a prognosis in leprosy are the concentration and distribution of the bacilli in the body and the resistance of the patient to the infection.

As in tuberculosis, so in leprosy also, many are infected who never develop the disease. In others there are abortive clinical signs which appear chiefly in the form of macules during some period of debility, and disappear again when the general health is restored. In others again the disease is confined to a single nerve and its branches, the infection being unable to escape either through the epineurium or through the terminal branches in the skin. In some cases two or more nerves are affected in this way, but the disease is not generalized.

LOCALIZED INFECTION

The confining of the infection to one or more nerves is a sign of comparatively high resistance to the disease. Clinically there are signs of thickening and tenderness of the nerves affected, and local neural signs in the form of sensory, trophic, and vascular changes in the skin, muscles, bones, and joints. In these cases the lesions may remain stationary for a considerable period of months or even years, or active signs may gradually disappear, self-healing taking place. If at any time, while infection still persists, the patient becomes seriously debilitated due to an intercurrent disease or other cause, there is always the danger of exacerbation and widespread generalization throughout the body. In India—and there is reason to believe that the same holds good in many other endemic countries—more than half the patients showing clinical signs of leprosy belong to this resistant class. In them the prognosis is favourable, and it is so in direct proportion to the restriction of nerve involvement. While in a certain number of cases the disease is abortive and self-healing, in many others special treatment is necessary for ultimate recovery. In all, the factor of most importance is the restoration, improvement, and steady maintenance of as high a standard as possible of general health.

GENERAL INFECTION

In contrast to the cases described above are those in which the infection is not confined to the nerves, but spreads through the skin and mucous membranes, invades the lymphatics, and involves the internal organs. This form of leprosy is much more actively progressive. At least to begin with, the clinical signs tend to be less conspicuous than those of the resistant form. For although the concentration of bacilli is greater, the tissue reaction to the bacilli both in the skin and in the nerves is considerably less. The disease is thus frequently able to spread throughout the body without attracting the attention either of the patient or of the physician. Later, as the concentration of bacilli increases enormously, more conspicuous lesions appear in the form of skin thickening and nodulation. This latter is the cutaneous form of leprosy. It is found in patients in whom resistance to the infection is low. In this form the nerves are also invaded—to a greater degree indeed than in nerve leprosy—but, as tissue reaction in the nerves is absent or only slight, the sensory, trophic, and other signs dependent on neural involvement are also comparatively slight.

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In this connection it should be stated that leprosy is a disease of exceedingly low toxicity. Its signs and symptoms are due not to toxins set free in the circulation but to the tissue reaction which the presence of *B. leprœ* excites locally. The local response to *B. leprœ* is in direct proportion to the local concentration of *B. leprœ;* but a much more potent factor in determining the cellular reaction is the resistance or immunity of the patient, which varies greatly in different cases.

We have indicated the two chief types of leprosy; the contrast between them is chiefly due to the degree of resistance, which is high in the former or neural type, and low in the latter or cutaneous type. As, however, in many cases the resistance varies considerably from time to time the signs of both types may be present at one time forming the *mixed* type of leprosy.

FACTORS INFLUENCING RESISTANCE

It will be plain from the above that the prognosis depends very largely on the resistance of the patient. There are four main factors which influence the degree of resistance:—

1. Natural resistance to leprosy is strong in healthy adults. Human leprosy has never been transmitted to experimental animals as a progressive disease, and their high resistance is apparently shared by healthy human adults. Also as with most other infectious diseases the degree of natural resistance to leprosy is probably greater in some subjects than in others, apart altogether from the state of their general health. It has been stated by some writers that this natural resistance not only applies to the individual, but also that in areas where leprosy has for a long time been endemic the more susceptible are gradually eliminated, and that thus race immunity is evolved. While this may be argued from the analogy of certain other diseases, there is but little direct evidence in its support.

2. Natural immunity is most markedly influenced by the age factor. In early childhood the resistance to leprosy is very low. Our recent surveys in Calcutta and in the Bankura District of Bengal show that children who have lived in close contact from their earlier days with infectious relatives or servants, in households where special precautions were not taken, seldom escape the disease; and the majority develop the severe infectious cutaneous type of the disease. Other children and adults exposed apparently to the same infection commonly either escape the disease or develop mild non-infectious lesions of the neural type.

Children infected in the first few years of life often show the 'juvenile' type of the disease. Slight depigmented macules with roughening and keratosis of the surface of the skin appear on different parts of the body from time to time, but bacteriological examination of these lesions is generally negative. About the age of puberty these macules may disappear permanently with recovery of the patient, or they may develop and show the cutaneous and infectious type of the disease; much depends upon the general health as the determining factor.

3. Most of those infected after the susceptible age-period—say after the tenth year—escape the severe and infectious type of the disease. If, however, the general health is severely depressed, or is even slightly depressed for a long period, the cutaneous (severe) type of the disease may develop. Such depression of health may be caused by a variety of causes; complicating diseases, dietary errors, pregnancy, etc.

4. Another cause of weakened resistance to leprosy is of a more specific nature—*viz,* the increase of the infection in the body beyond a certain degree. Thus a vicious circle is produced, the bacillary concentration facilitating the further increase of bacilli and paralysing the mechanism which would arrest that increase.

In contrast to the above is the effect of small infections, which generally tend to increase or supplement the natural resistance. Thus, in patients who have passed the age of increased susceptibility and are in fairly good health, contact even with highly infectious cases may, with or without the appearance of mild leprous lesions of the neural type, develop an acquired immunity. Even in healthy young children this specific immunity may be formed, provided that contact is not too frequent and the degree of infection be not too great.

Among healthy adults there tends to be a considerable hiatus between what we term 'resistant' and 'non-resistant' cases. In the former the disease frequently dies out or remains stationary for long periods of years without showing any tendency to increase; in the latter it tends to progress. The hiatus between the resistant and non-resistant cases may be broken down by anything which impairs the general health.

In determining the resistance of the patient we rely chiefly upon the clinical and bacteriological examination. In addition, however, the leprolin test is of considerable value, and the erythrocyte sedimentation test is of great use in estimating the general resistance.

The prognosis may be conveniently divided under three main heads: (1) In infectious contacts (contacts with infectious cases) without signs of the disease, what is the likelihood of leprosy developing? (2) In those in whom leprosy has developed, and definite signs are present, what are the chances of recovery? How long will it take, what are the chances of relapse, and will recovery take place with or without deformities and disablement? (3) How long should treatment be continued after active signs have disappeared, and how long should the patient be kept under observation?

INFECTIOUS CONTACTS

We use this term to indicate those who have been in contact with infectious cases of leprosy but who have not so far shown any signs of leprosy.

The factors which determine the danger of contact are its closeness and duration, the infectiousness of the case, and the age and general health of the person exposed to contagion. Thus a debilitated adult or a young child may occasionally acquire the disease after even short or slight contact with a highly infectious case. Undoubted cases are also known where dwelling in a house vacated by a leper, or use of furniture formerly used by a leper, have been followed by the appearance of leprosy. Fortunately the danger of contracting leprosy in Great Britain is now very slight. Besides those who have recovered from the milder forms of the disease, there are probably about one hundred patients with active leprosy in Great Britain at the present day. With few exceptions these have contracted the disease in our colonies, or in other tropical countries. Some twelve are in a leper home in Essex; the rest live in their own homes. There the simple precautions taken are sufficient to prevent the spread of infection.

Leprosy is far less communicable than tuberculosis. Chiefly for this reason the former disease in an endemic form died out from England centuries ago, while the latter is still prevalent. That is why leprosy is not a notifiable disease, and thus we have no exact figures regarding the few cases that still remain.

In making a prognosis the most important point to be ascertained is the age when contact first took place. If this was within the first few years of life, and especially if there was prolonged and close contact with a highly infectious case, then, even though several years may have passed since then and no signs of the disease have been noticed, it is possible that a generalized infection may have taken place which will show itself sooner or later. If the reaction to leprolin is strong the prognosis is good; if the reaction is negative or weak the prognosis is unfavourable. In such cases careful clinical examination with the aid of a suitable light will often reveal macules which had escaped notice before; or careful and repeated bacteriological examinations of the skin or mucous membrane may show acid-fast bacilli.

In healthy adults who have been in contact with infectious cases and show no signs, the prognosis is as a rule much more favourable. If a considerable period has passed since contact took place then definite

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signs of the neural type of leprosy would probably have declared themselves if infection were present in the body, but here too the leprolin test is of value.

In adults who are or who have been in a poor state of health, the danger of the infection developing is much greater. If there is a history of severe or prolonged disease or of other predisposing conditions during the interval since contact took place, if the sedimentation index is high, and if the reaction to leprolin is negative or weak, then a very guarded prognosis is necessary; clinical or bacteriological re-examination of the patient may reveal positive signs sooner or later.

PATIENTS WITH LEPROUS LESIONS

In making a prognosis the important points to ascertain are the degree of infection and the special and general resistance of the patient to the disease. All patients should be divided into resistant and non-resistant groups. It is important to go carefully into the medical history of the patient, especially with regard to predisposing causes; the general appearance, bacteriological examination, and the extent of the lesions may give a clear indication, and here again the leprolin and sedimentation tests should be used.

The following table gives the main distinctions between resistant and non-resistant cases:—

Resistant	*Non-resistant*
One or only few macules, with anæsthesia to light touch, and with pronounced erythema; thickening and induration of the skin either throughout the lesion or at the margin.	More numerous and widespread and flatter lesions without marked erythematous thickening or induration, the margin merging with the surrounding skin. Erythema less pronounced. Hypopigmentation is more noticeable.
Thickening and tenderness of the sensory or mixed nerves connected with the macules.	Nerve thickening as a rule not marked.
Generalized infection of the skin is never present, the disease of the skin being confined to a few macules.	In advanced cases skin involvement may be widespread covering the whole body, with no appearance of macules. While in some of these cases there is noticeable thickening and nodulation, in others it is difficult to recognize the presence of disease on inspection though bacteriological examination shows widespread infection.
Lesions grow slowly or remain stationary for long periods, often for years.	New lesions continually appear and macules grow rapidly in size and coalesce, until almost the whole skin is involved.
Bacteriological examination of the skin shows few or no acid-fast bacilli.	Bacilli are found in lesions of the skin and nasal mucosa in greater or smaller numbers.
There is strong reaction to leprolin.	Reaction to leprolin is absent or very weak.

In resistant cases the prognosis is excellent provided the patient remains in at least moderately good general health. The lesions should disappear under treatment in a comparatively short time (a few weeks to a few months); and the danger of relapse, once all signs of active disease have disappeared from the skin and the nerves, is very small, provided that the patient's general health is maintained.

In non-resistant cases the prognosis is much more doubtful. If the general health is good, or if under suitable treatment it becomes good, and especially if the sedimentation of erythrocytes is slow, then a favourable though guarded prognosis may be given. The period of treatment necessary will, however, be much more prolonged. In many cases of low resistance a definite prognosis should be delayed until there has been time to observe the progress made under general and special treatment. The effective treatment of complicating diseases, along with the carrying out of a strict regime of careful diet, active and suitable exercise, and regular habits, is often found to bring about within a few months, or it may be in one or two years, improvement up to a certain point, after which the patient progresses steadily towards recovery, though several years may be necessary to get rid of all active signs.

RESIDUAL TROPHIC LESIONS

The question of recovery with or without permanent lesions and deformity is an important one for the patient. The earlier treatment is begun and the more carefully it is carried out, the less likelihood is there of the development of trophic lesions of the hands, feet, and face. Carefully planned physical exercise is very important in this connection. Nerve reaction in the ulnar and peroneal nerves, which so commonly results in claw-hand and drop-foot, seldom occurs in patients with firm well-developed muscles. In most cases a certain amount of anæsthesia and, if the larger mixed nerves have been involved, of trophic changes in the small muscles are likely to persist. These should not be mistaken for active signs of the disease.

PERIOD OF TREATMENT AND OBSERVATION

The length of treatment and the period of observation necessary after the cessation of treatment are matters of extreme importance. Treatment is frequently stopped far too soon, and relapse follows causing disappointment to the patient and loss of confidence in the treatment of leprosy.

In non-resistant cases clinical appearances are most deceptive. Lesions will often disappear as a result of complicating diseases, the depression of cellular reaction to *M. lepræ* giving a false appearance of improvement. Bacteriological examination should be carried out thoroughly and repeatedly till the results become negative in smears taken from all parts of the body before the disease is declared quiescent, and it should have remained quiescent for at least two years before it is declared arrested. Thereafter the patient, though he may resume his ordinary social life, should remain under observation for several years; for though bacilli may be absent from the skin and nasal mucosa, they may still remain present in the peripheral nerves. Until careful bacteriological examination is negative on repeated occasions, the patient should observe isolation at least as regards his room, furniture, and eating utensils. There is probably little danger from his travelling in public vehicles, unless he is a highly contagious case; but he should avoid having his meals with others, except at home where special precautions can be easily arranged. He should be specially careful to avoid contact of any sort with young children.

In resistant cases the necessary period of treatment and after-observation is much shorter. In most of them bacteriological examination is negative from the beginning or only very few bacilli can be found in the lesions. In such cases where careful and repeated bacteriological examinations have been consistently negative the criteria of quiescence and arrest must be based chiefly upon clinical examination: (*a*) lesions are flattened out, so that the finger on passing along the surface from the normal skin to the lesion cannot detect any raised margin, and the skin picked up between finger and thumb feels no thicker than the healthy surrounding skin; (*b*) thickened nerves lose their tenderness on pressure or percussion, and become reduced to their normal size; (*c*) no new lesions appear, and the original lesions no longer increase in size; (*d*) the areas of anæsthesia, though not entirely disappearing, remain stationary in size, neither increasing nor diminishing.

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Lastly, in all types of cases and at all stages of the disease the mental outlook and equipment of the patient are of vital importance. The intelligent patient who is full of courage and determination to get better stands a much better chance than the stupid, lazy, or opinionated one. This is true of other diseases, but in none so much as in leprosy, in which the justification for mental depression is so great, and so much depends on the prolonged and persistent efforts of the patient himself.

The Treatment of Asthma

By C. M. WILSON

(From the *Lancet*, Vol. II, 10th October, 1936, p. 872)

AT one time a cold in the head infecting both antra left me with asthma although I do not come of asthmatic stock. I have now been free from asthma for some years, but my experience as an asthmatic stretching over some months has influenced my attitude towards treatment. My physicians spent a long time in examination of the chest, but only the smallest fraction of the consultation was devoted to treatment. Moreover they left me convinced that I had asthma for life. A middle-aged doctor contracting asthma is in no need of depressing doctrines, he himself will supply the note of pessimism.

Nothing is known of the asthma diathesis which is the essential factor in the pathogenesis of the disease. If it is due to some change in the chemistry of the blood we know nothing of that change. Accordingly the congenital abnormality at the bottom of the malady remains untreated. The effect of altitude is interesting in this connection, and this effect is seen if the patient goes up in an aeroplane just the same as if he lives in the Alps at a height of four thousand feet, suggesting that it is lowered oyxgen tension or some such factor that leads to the biochemical changes which bring freedom to the asthmatic. The vast majority of asthmatics lose their asthma in the Alps, but it soon recurs on returning to lower levels. It is not therefore a very helpful line of treatment. But in the case of asthmatic children, permanent relief often follows a prolonged stay in the Alps. At such places as Montana, Villars, and Chateau d'Oex children can be educated in schools where English is spoken at no greater expense than at a good preparatory school when it is remembered that the child also spends his holidays in Switzerland. In people with the asthmatic diathesis certain stimuli—chemical, reflex, and psychical—lead to bronchial spasm. The chemical stimuli such as the emanations from animals and so forth raise the question whether skin tests are worth doing in an asthmatic. Dramatic results have followed the removal of noxious material or desensitizing the patient to the protein concerned, but skin tests have on the whole proved disappointing. Of the reflex causes of asthma, an overloaded stomach is a proverbial cause of trouble and there are places on the continent where the patient is allowed nothing to eat after 5 p.m.

As far as the nose is concerned, though many claims have been made, the results of treatment are not very encouraging. Everyone will agree that if there is infection of the sinuses it is likely to lead to bronchitis and that an attempt must be made to clear up the infection. If there is pronounced nasal obstruction due to a deviated septum or polypi there is something to be said for the provision of a clear air-passage when other methods of treatment have failed. The touching of the nasal mucous membrane with the cautery under cocaine is perhaps the most hopeful method open to the aural surgeon, especially if the nose appears healthy. But only a fraction of cases respond and relapses are common.

One can hardly exaggerate the importance of the mind in asthma. As a man may go to bed knowing that he has an early train to catch, so an asthmatic retires anticipating a nocturnal attack. For months I myself woke every night at 2 a.m. which could not be attributed to any organic reason. An asthmatic must be weaned from his habit. Nothing else in the treatment of asthma is of the same importance as the discipline of the mind. The mental processes are familiar to anyone who has suffered from the disease. To those who happily have not learnt these processes by personal experience the letters of Disraeli to Lady Bradford will be instructive. Disraeli thanked God for the gout because he was generally free from asthma when he had gout. But when he was near the end Queen Victoria insisted on a second opinion. Kidd, his doctor, called in Sir Richard Quain, but Quain refused to meet a homœopath, and only consented to do so when it was represented to him that it would be disloyal to do otherwise. Even then he demanded in writing assurances that Kidd was acting under him and that Disraeli was being treated not by homœopathy but by allopathy. With these assurances Quain consulted the Head of the Profession and, receiving the 'All Clear', proceeded with Kidd step by step and arm in arm in hopefulness to hold their first consultation.

In the treatment of the actual attack adrenalin is most useful. The unpleasant palpitations following the hypodermic injection and the possible injurious effects on the blood pressure and arteries are avoided by giving small doses. One or two minims are adequate. Adrenalin can usefully be given as a vapour. Ephedrine has the advantage that it can be taken by mouth and that the effect lasts six or eight hours. The inhalation of fumes from burning such substances as stramonium is liable to irritate the bronchial mucous membrane, so that I never use this method in an attack.

In suitable patients the use of physical exercises in asthma is a more hopeful line of treatment than any medicinal remedies. The difficulty in asthmatic breathing is to empty the lungs which are overdistended. The first object of the exercises is to teach the patient how to do this by using the lower part of his chest and abdominal muscles and by diaphragmatic breathing instead of using only the upper part of the chest. Exercises should be carried out with the assistance of a masseuse who is an expert in remedial exercises. The art of treating an asthmatic is an individual art, but there is one secret common to all successful treatment and this is to teach the patient to discipline his mental processes. The consensus of informed opinion will probably now wish to add another discipline, the control of the respiratory movements.

Cough in Children

By DR. ALAN MONCRIEFF

(From the *Lancet*, Vol. II, 10th October, 1936, p. 871)

THE commonest symptom in outpatient work in a children's department is undoubtedly 'cough', and I have thought it preferable to deal with this complaint rather than with any of the diseases in which it specially occurs. Not only is it the commonest presenting symptom in childhood taken as a whole, but as a rule it is not associated with disease in the chest, so that the average textbook dealing more particularly with disease syndromes does not adequately cover its more usual causes.

Viewed as a modified reflex act, cough can be regarded as always having somewhere a site of origin. I do not propose to deal in detail with the very interesting work which has been done in recent years on the relative sensibility of the various areas, but I must mention that the origin of the cough reflex is much more likely to be in the upper part of the respiratory tract—*i.e.*, above rather than below the bifurcation of the trachea. The simplest way to consider the subject is to follow the respiratory tract down from its upper reaches and thus enumerate the different areas from which a cough may arise. Acute inflammation of the nose and nasopharynx comes first, and it is here that adenoids and infections of the nasal sinuses are of great importance. Pharyngeal coughs and tonsillar coughs

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are probably the commonest you find in childhood, and it is well to realize that a cough rather than the complaint of a sore-throat is the presenting symptom in most cases of tonsillitis in the young child. It is just this type of cough which is diagnosed as bronchitis by the mother and often treated as such without medical advice; which, in the case of diphtheritic tonsillitis for example, may be a disastrous course.

The middle ear may strictly be regarded as a branch of the respiratory tract, but I doubt whether a cough ever arises as a result of ear disease alone, although I have been told of an instance where a foreign body in the external auditory meatus did appear to be the cause of cough. Next on the way down comes the larynx, and here the characteristic 'croupy' element generally makes diagnosis easy. In the child most laryngeal coughs are due to a combination of inflammation and spasm, and quite apart from the strict groups of laryngitis and laryngismus there are two conditions to be remembered of importance with a croupy cough. One is the early stage of measles in which the cough is probably due to Koplik's spots on the laryngeal mucosa and the other is retropharyngeal abscess. Arising from the trachea are a group of coughs—harsh, painful, ineffective—which are the end-results of an infection of the nose spreading downwards. Coughs of tracheal origin may also occur with an enlarged thymus or enlarged mediastinal glands. Inflammation of the bronchi may be associated with extraordinarily little cough; usually there is a certain amount of coughing, but it is noticeable that this diminishes as the finer tubes become affected and even more if the inflammatory process reaches the alveoli. Pneumonia, for instance, may be an almost silent disease, and such a serious malady as acute miliary tuberculosis gives rise to little or no cough. In speaking of tuberculosis I would emphasize that this disease as a cause of cough in childhood is comparatively rare.

Still further down, so to speak, comes the pleura, and a short period of irritating cough is a feature of the early dry phase of pleurisy. Of the other forms of cough, which do not appear in this list, whooping-cough is the most important. The diagnosis of this malady by means of the cough plate is becoming perfected, and I have found the sublingual ulcer of very great value, particularly in the early stages. The possibility of a 'stomach cough' is supported by certain experiments, but I think more often the cough and the gastric upsets have a common origin in the catarrhal state of the pharynx. Finally cough may sometimes be a habit spasm.

When the origin of a cough has been correctly diagnosed treatment becomes relatively simple. Clearly for coughs affecting the upper respiratory tract a sedative linctus is indicated in addition to measures dealing with the local infection. A useful prescription is (for a child of one year): tinct. opii camph., oxymel scillæ, and glycerin., āā 10 minims; water to 60 minims; one teaspoonful as required. If there is evidence of bronchitis some expectorant mixture is usually employed, but I am coming to believe less and less in the value of these drugs. The commonly used tincture of ipecacuanha in doses of 5 to 10 minims is probably largely ineffective, while larger doses may seriously upset a child's digestion. Probably the best clinical measure in bronchitis is to give a copious supply of fluid to keep the bronchial secretion from becoming thick and retained. For the same reason a moist atmosphere is also beneficial, provided it is not allowed to get too warm; it is best obtained by steaming a kettle into the room at intervals while the temperature is not allowed to rise higher than about 65°F. to 70°F. Liniments applied to the chest are probably mostly of value because they lead to the child inhaling a certain amount of the medication vaporized by the warm body.

With recurrent bronchitis in the young child two points should be kept in mind as regards treatment. The first is that asthma often masquerades in this guise; the second, that the atmosphere of many houses is dry and dusty and may predispose to inflammation of the delicate mucous membrane lining the respiratory passages.

Hypnotic Drugs

By L. I. M. CASTLEDEN, M.D.

(From the *Practitioner*, Vol. CXXXVII, September, 1936, p. 358)

LACK of sleep, or imperfect sleep, is so common a symptom that most practitioners have frequently to treat it whatever their department of medicine may be. This together with the fact that the list of hypnotics is constantly growing both in length and in complexity make it desirable to have some kind of working classification of these drugs from which a suitable one may be chosen and into which new preparations may be fitted as they appear. This article aims at an attempt to produce a simple classification of this kind. At the outset it is well to remember that hypnotic drugs are not the only means available for producing sleep, neither should they be the first remedy to be considered. The normal physiology of sleep is not yet understood, but one of the simplest hypotheses is that put forward by Samson Wright, who states that it may be merely the damping down of the conductivity in the afferent and association paths of the nervous system. Such a conception, whilst probably not the whole truth, is of use to the clinician in that it serves as a reminder of the paths by which sleeplessness may come. There are the extero-ceptive impulses from the external environment of the patient through the surface of the body and the special senses; the proprio-ceptive impulses from the posture of or pressure upon muscles, bones and joints, and from the large group of visceral stimuli amongst which the cardiovascular, gastric and rectal are the most important. In insomnia due to these latter stimuli an alkali or carminative, if there is flatulence, or an enema, if the rectum is loaded, will produce sleep as readily as a hypnotic. Lastly there is the over-activity of the higher centres themselves, the psychic causes of insomnia, one of the commonest of which is the fear that sleep will not be obtainable and of the dire consequences that are likely to ensue. Correction of abnormalities in what may be briefly termed the external and internal environments of the patient may of itself prove to be a hypnotic measure. In spite of this correction, or because it cannot be wholly effected without them, recourse to hypnotic drugs will often be necessary.

THE IDEAL HYPNOTIC

This would have the following properties:—

(1) It would be 'light', that is to say, readily absorbed so that a reliable effect is produced at a regular interval after administration.

(2) It would be rapidly broken down, but not too rapidly, or excreted so that, on the one hand, it would remain in the tissues long enough to ensure a sufficient length of sleep but, on the other hand, not so long as to cause drowsiness the next day or to produce cumulative effects if repeated daily.

(3) It must not produce side actions either unpleasant, such as preliminary excitement and gastric irritation, or dangerous, such as cardiac or respiratory depression.

(4) There must be a sufficient margin of safety between the therapeutic and toxic doses.

(5) The drug must not produce tolerance or habit when administered over long periods.

No drug possesses all these qualities or ever will, but each new hypnotic as it appears is said to be nearer the ideal and there is a real danger that the old, well-tried and reliable remedies are apt to be forgotten in the admiration of the new. Most of the new hypnotics are barbiturates; for this and other reasons they are best kept in a group by themselves. If the opiates are also placed in a separate group, the remainder will be

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chiefly composed of the older drugs. These can be considered under the heading of mild and powerful.

THE MILD HYPNOTICS

(1) The analgesics, *phenacetin, phenazone, amidopyrin,* apart from allowing sleep by removal of a neuralgic or myalgic pain, have a definite mild hypnotic action. Particularly is this so with aspirin, which for most adults and nearly all children is hypnotic.

(2) The alcohols would come into this group, though their use for this purpose, except in the case of elderly debilitated patients who are already habituated to them, should be deprecated. *Amylene hydrate,* an alcohol with more hypnotic action than the rest, has fallen into disuse on account of the preliminary excitement it may induce.

(3) The *bromides,* though really sedatives, are useful in the insomnia of overwork, worry and agitated states. They are rapidly absorbed and more slowly excreted and so may give rise to some depression on the following day. They act by virtue of the bromide ion and so there is nothing to choose between the various bromides at our disposal. The slowness of excretion is due to the fact that the kidney cannot distinguish between chloride and bromide and so both are eliminated in the proportions in which they are dissolved in the tissue fluids, a property which is employed when it is desired to hasten the excretion of bromide. *Sedobrol* and similar proprietary preparations are broths containing sodium bromide in place of sodium chloride.

(4) The urea derivatives (other than the barbiturates) are *carbromalum* (*adalin*) and *bromural,* which, as their names suggest, are bromide urea compounds, and *sedormid,* which has no bromide in it. These substances are mild and light hypnotics, rapid and pleasant in action and without after-effects. Bromural has recently been revived by one of the drug houses and is being pushed as a safe hypnotic which is not a barbiturate; these claims are of course true.

(5) The carbonates, examples of which are *urethane* and *hedonal,* are so mild that for some adults they do not seem to be sufficiently potent. They are rapid, safe, have no after-effects and can with advantage be used for children.

THE POWERFUL HYPNOTICS

(1) *Paraldehyde* is well known and much used. It operates quickly, has no unpleasant after-effects, and the sleep it gives lasts several hours, being quiet, refreshing and dreamless. It has no depressant action on the heart or respiration and is of special value in delirium tremens for these reasons and also because it is closely allied, chemically, to alcohol. The only dangers in its use seem to be in cases of acute nephritis or when there is advanced cirrhosis of the liver. Objections to its use are the nasty taste and the odour it gives to the breath. These cannot be overcome but the former can be mitigated considerably by giving the drug as an emulsion in which form it is a much more elegant preparation than when merely added to water: 120 minims of paraldehyde can be emulsified in one ounce of water by the addition of 30 minims of tincture of quillaia. The best flavouring agent is liquorice.

(2) The sulphone group, *sulphonal, trional,* has justly become unpopular for the action is uncertain, because such drugs act better in some individuals than in others. Excretion of this group is slow, producing drowsiness the next day and a liability to cumulative effects if repeated doses are given. All members of this series are liable to produce liver and kidney damage and hæmatoporphyrinuria.

(3) The halogen derivatives are some of the most useful sleep-producing drugs available. It used to be taught that they depress the heart in varying degrees and should therefore be used with caution if this organ is feeble, but recent work has shown that they exert no toxic action on the cardiovascular system in therapeutic doses. All are gastric irritants unless given well diluted. None of them is of any use if insomnia is due to pain. *Chloral hydrate* is typical of this group. It is fairly rapidly absorbed, certain and reliable in action and very useful in simple insomnia or in that due to overwork or worry, especially if combined with bromide. Children take it well. A useful preparation that is not used so much as it might be is syrup of chloral which contains 10.9 grains in 60 minims. Chlorbutol, better known as *chloretone,* has come to be associated with the treatment of sea-sickness and with its properties as a local anæsthetic, but it is a good hypnotic, having the same properties as chloral with less toxicity and less gastric action. *Chloralamide,* another member of this series, is an excellent hypnotic. It is, however, very insoluble, this property probably accounting for its lack of popularity for, unless given in suitable form, absorption and therefore action may be much delayed. There are three ways in which chloralamide may be given:—(*a*) As a powder, the patient being instructed to dissolve it in a little whiskey and then to add water. If this method is used then the prescription must be for pulv. chloralformamide. Should crystals be dispensed, as they may be if the powder be not specified, the patient, after stirring for some time, will either leave the dose at the bottom of the glass or, if conscientious enough to wash it all down, will spend a wakeful night and sleep most of the following day. (*b*) Each 60 minims of spiritus vini rect. added to one ounce of water will take up 10 grains of chloralamide in the cold. There are obvious pharmacological objections to such a mixture if a fairly large dose is intended. (*c*) Tincture of orange, 60 minims, with an equal quantity of simple syrup to each ounce of water will take up 30 grains chloralamide with 30 grains of bromide as well, which is as much as is ever required of this useful mixture. The only way to get the drugs into solution is to dissolve the chloralamide in the tincture with gentle heat and then to add the other ingredients dissolved in the requisite amount of water. Chemists seem to be afraid to heat chloralamide because heat dissociates it, but the temperature at which this happens is 130°F. which is above the boiling point of alcohol.

OPIUM

Opium and its derivatives are so well known and so widely used as to need only a brief mention. They are all pre-eminently anodyne in action and are therefore the drugs of choice in the insomnia which is dependent upon painful conditions. They are also indicated in the sleeplessness which is associated with heart disease. Apart from these indications they are not good hypnotics. *Nepenthe* is an elegant and useful preparation one-third less strong than the official tincture and without the latter's resinous messiness when diluted. It has the advantage that its name does not suggest an opiate to the uninitiated patient so that it may be added to mixtures containing soluble hypnotics when it is desired to impart some pain-relieving quality to them and later withdrawn. *Omnopon* and *opoidine* are preparations of the total alkaloids of opium which are said to give fewer of the side actions such as nausea and constipation. Omnopon is certainly less nauseating to most patients who are affected that way by morphine. Spasmalgin contains a derivative of atropine, papaverine and omnopon. *Trivaline* is morphine and cocaine valerianate. *Dilaudid,* a new preparation, is said to have all the pain-relieving properties of morphine without having any other action. This unfortunately is only partly true but appears to be more correct than the similar claims for omnopon.

THE BARBITURATES

These drugs are best kept in a class by themselves because they exhibit properties and actions characteristic of a group which contains in itself a practically complete range of hypnotics. They are all substitution products of hypnotics. They are substitution products of malonylurea which is itself the product of the union of malonic acid with urea.

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The malonic acid end of malonylurea has two hydrogen atoms either or both of which can be replaced by organic radicles, which may be of the paraffin series, methane, ethane, or propane having one, two, three and so on carbon atoms in an ascending scale, or of the phenolic C_6H_5 group, or again of the acetylene series, *e.g.*, allyl with three carbon atoms. It is obvious from these few examples of possible linkages that a great many permutations and combinations are possible. If, for instance, the two hydrogen atoms are replaced by two ethyl groups (C_2H_5) the compound so formed, di-ethyl malonylurea, is *barbitone* or *veronal* itself. All such substitution products of malonylurea have a hypnotic action and it would seem that the fewer extra carbon atoms that are attached the lighter, *i.e.*, quicker and shorter acting, the hypnotic will be, and, conversely, the more carbon atoms the heavier. A rough rule for guidance is that an ethyl or mythyl group in a barbiturate makes it a light one whilst a phenyl group makes it heavy, and these groups are the most common ones to find, in association with others, so that by looking at the proper chemical name of the drug, which is always printed somewhere on the package or in the literature, usually in microscopic letters, some idea can be obtained of its probable action. Examples of this are *soneryl*, a useful light hypnotic which is butyl-ethyl-malonylurea, whilst pheno-barbitone is *luminal*, so heavy, *i.e.*, long and slow in action, as to be almost useless as a hypnotic but invaluable for other purposes because of these very properties.

Some barbiturates are soluble but most are not. If the sodium salt of any of their compounds is made it becomes soluble and therefore has its rate of action accelerated because solubility increases both absorption and excretion. An excellent example of this is *evipan* which has two methyl groups and which is rapid in taking effect and transitory in the drowsiness it produces. It is applicable to those patients who wake at 3 or 4 a.m. and cannot get to sleep again. Four grains by the mouth will produce three or four hours more sleep and the effects of the drug will be gone by the time the patient wakes again. *Evipan-sodium*, on the other hand, is so rapidly diffusible on account of the increased solubility that when injected into a vein its effects are over in about twenty minutes. There are about 168 barbiturates that can be used in medicine and it is possible in so short an article to mention only a few of them. Some have been dealt with as examples of the common structure, others in frequent use are *hebaral-sodium*, the soluble sodium compound of hexyl-ethyl-malonylurea, which is light, efficient and reliable, giving no heaviness the next day. It is an excellent preparation for bedtime use. Others are *dial*, which though light is not so mild a drug as it is popularly supposed to be, *barbitone* itself and its sodium salt *medinal, phanodorm, pernocton*, and so on through the series to the really heavy members, such as *luminal, luminal-sodium* and *prominal*. Certain barbiturates have found a special use in inducing sleep before anæsthesia, *nembutal* being the best known example. It is said that hebaral-sodium is useful in this respect and does not cause the excitement not seldom seen after nembutal, and that *amytal-sodium* is particularly indicated for premedication in children. This last drug has a special indication in that it may be given by intramuscular injection of an aqueous solution of three grains to calm the almost maniacal excitement sometimes seen in cases of exophthalmic goitre.

Idiosyncrasy to barbiturates is said to occur in 3 per cent of people, and toxic effects may arise from the administration of quite small doses. These may take many curious forms, a few of the commonest being:—

(1) In the skin. (*a*) Urticarial weals. (*b*) Bullæ. (*c*) Morbilliform or scarlatiniform maculo-papular erythema. (2) Alimentary. (*a*) Anorexia. (*b*) Nausea. (*c*) Epigastric pain. (*d*) Diarrhœa. (3) Nervous. (*a*) Defects of attention and memory, hence their use as basal narcotics, and hence, also, their danger if patients are administering the doses themselves. (*b*) Lassitude, fatigue and backache. (*c*) Confusion, delusions and hallucinations. (*d*) Diplopia, nystagmus, ataxia and even coma. (4) Most barbiturates are cardiac depressants of more or less serious nature, and all cause some fall of blood pressure.

An interesting recent development is that by joining the barbiturate radicle to a metallic base, instead of to sodium, its toxicity and depressant action is diminished. *Calcium phanodorm* has been made, and more of such compounds will be produced in the near future. This detoxicating effect is not limited to this group of drugs. *Calcium aspirin*, for instance, is said to be less toxic, though no less analgesic, than plain aspirin.

In spite of severe criticism of their administration the malonylureas have established themselves as useful and reliable hypnotics, as reasonably safe as most potent medicines if wisely used, and out of the controversy that has raged around them certain rules for their administration have emerged:—

(1) Obese or debilitated patients or those with liver or kidney disease tolerate them badly. (2) Patients with arteriosclerosis, myocardial disease or very low blood-pressure react badly to the shorter acting drugs. (3) Never repeat, for hypnotic purposes, a dose of a barbiturate. (4) Never mix barbiturates. (5) Never give them before, with, or after an opiate. To which excellent rule there is an equally excellent exception, namely, that medinal and nepenthe go very well together. (6) They are better not prescribed in tablet form but in a cachet, as a powder, or best of all in solution. Substitution or reduction of the dose is then possible, which it may not be if the patient has become habituated to a trade-marked tablet.

MIXTURES

Hypnotic drugs are good examples of synergism and for this reason many blendings of them have become traditional, such as pot. brom. and chloral, and all practitioners discover favourite mixtures of their own. In their search for a sleep-producing drug, with pain-relieving qualities, which is not an opium-derivative, the drug houses have put many proprietory preparations on the market which are mixtures, usually in tablet form. *Allonal, cibalgin, veramon* are examples of a few. Most of them are mixtures of amidopyrin plus a barbiturate, despite the fact that recent work has demonstrated the danger of amidopyrin. There is usually too little analgesic in one tablet and too much barbiturate in two; it is better therefore, if desired, to use such a preparation to prescribe a personally-tested mixture of analgesic and hypnotic.

In the fact that the form in which they are given and that the time of their administration may effect their action, the hypnotics are no exception to other drugs. Solution accelerates their action as does administration at a time when the stomach is empty. It is common to hear patients complain that a preparation upon which reliance can be placed has failed to act when in reality what has happened is that it was taken immediately after a late and heavy meal. For similar reasons if the drug is given in a solid form, particularly as a tablet, the patient should be instructed to take a good draught of water, and not merely sufficient to wash it down.

Asthma: Immunological Mechanism, Diagnosis, and Treatment, with Special Reference to Vaccine Therapy

By D. HARLEY, B.SC., M.B.

(From the *Lancet*, Vol. II, 15th August, 1936, p. 367)

IT is generally accepted that the asthma syndrome is an expression of a state of abnormal sensitivity or increased reaction (allergy) of the body to certain foreign substances, most of which are quite harmless to normal individuals. To take an extreme case; reclining in an arm-chair padded with horsehair causes an attack of asthma in a 'horse-sensitive' asthmatic;

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pricking the patient's skin with a needle which has been dipped in an extract of horsehair produces a violent local reaction; the injection of minute amounts of the extract causes severe asthma; the intravenous injection of a few *minims* of horse serum in such a case has been known to kill.

The evolution of the asthmatic state can be divided into three parts:—

1. *Predisposition* of the individual to become hypersensitive. This is commonly inherited but may be acquired. The exact nature of this immunological or biochemical kink is unknown.

2. *Development of hypersensitivity* to one or more of a wide variety of foreign substances. Contact with the offending substances then results in the violent reactions characteristic of the hypersensitive state. Though hypersensitiveness is developed commonly to substances with which the person came into close and repeated contact before the commencement of the asthma, this is by no means a constant feature and the capriciousness of the selection of sensitizing substances is well known. When the hypersensitive state is first developed the specificity of the reactions is usually very definite, the horse-sensitive asthmatic reacting to the hair and dandruff of horses but not to that of dogs or cattle. More commonly the sensitivity is multiple but specificity is still a prominent feature. After a time the asthmatic tends to have his attacks precipitated by one or more of a wide variety of non-specific factors unrelated to the primary exciting cause.

3. *Secondary non-specific factors.*—These include nearly all possible forms of minor trauma—toxic and psychic, direct and reflex, dietetic indiscretions, etc. It has been suggested that these act by lowering the 'tolerance' of the asthmatic to the primary specific exciting causes, so enabling the latter to provoke an attack in even more minute amounts than usually required.

Immunological mechanism

(a) *Hypersensitivity to non-bacterial products.*—These include inhalants (animal dandruffs, pollens, face powder, house dust, feathers) acting directly on the lungs, and ingested and injected substances (foods, drugs, sera) which reach the lung tissue *via* the blood stream. The active principles in these substances are variously designated *idiotoxins* (Freeman), *allergens*, and *atopens*. When the specific idiotoxins are brought into contact with the tissues of the asthmatic the characteristic reactions of the hypersensitive state are produced; the pathological basis of these reactions is spasm of smooth muscle and increased permeability of blood capillaries; thus urticaria is produced in the skin (this is utilized in the well-known diagnostic skin tests), asthma in the lungs, paroxysmal rhinorrhœa in the nose, etc. The injection of hypersensitive serum into the skin of a normal individual renders the latter hypersensitive locally so that subsequent contact with the specific idiotoxin results in the formation of an urticarial weal. When such a passively sensitized area of skin is acted upon by the specific idiotoxin, in sufficient quantity to elicit the maximum reaction, the site becomes desensitized—*i.e.*, does not react to further treatment with idiotoxin. Passive transfer of sensitivity is due to the presence in the sensitizing serum of special antibodies, the *atopic reagins, allergins,* or, more fittingly, *idioceptors*. When idioceptor is attached to the tissue cells the latter are rendered hypersensitive. The desensitization of patients by repeated injections of suitable doses of specific idiotoxin is the result of inactivation of idioceptor as shown by the abolition of the skin sensitivity.

(b) *Hypersensitivity to bacteria and their products.*—One is impressed by the large number of asthmatics presenting themselves for investigation and treatment in whom the asthma first appeared after or is associated with some infective process, often comparatively mild infections of the respiratory tract. Many of these cases give negative or only very feeble skin reactions to inhalant and ingestant idiotoxins but bacteriological examination almost always reveals marked qualitative or quantitative abnormalities. The excellent results of vaccine therapy in these cases support the hypothesis that the relationship between the bacteria and the asthma is one of cause and effect. Such hypersensitivity to bacteria however is of a different character to the hypersensitivity to non-bacterial substances discussed above. In the latter skin reactions are of the immediate type, consisting of an urticarial weal with erythema, fully developed in 15 minutes or less, and passive transfer of sensitivity by injection of serum can be regularly accomplished. Though immediate skin reactions to bacterial vaccines have been occasionally reported, the common type is a delayed reaction, essentially inflammatory in nature, which takes 24 hours or more to develop, and passive transfer by the injection of serum is not obtained.

Bacterial vaccine skin tests in the diagnosis and treatment of bacterial-sensitization-asthma have been widely used in recent years, especially by clinicians in America. The usual method is to prepare vaccines of the bacteria of the sputum, etc., and test the patient's skin reactions to them. Those which produce reactions are employed for therapeutic purposes. Unfortunately these vaccine skin tests have proved unsatisfactory as it has been found that non-asthmatic individuals often give similar reactions to the vaccines, and also that vaccines of the normal intestinal Gram-negative bacilli often cause bigger reactions in the skin of the asthmatic than do the infecting organisms from the sputum (Rackemann and Graham, Benson, etc.). Experimental investigations (Harley) indicate that the delayed skin reaction is due to an increased sensitivity of the skin cells to the somatic nucleoprotein of the intact bacteria. This type of hypersensitiveness, or allergy as it is commonly called, is produced regularly in man and animals by natural and experimental infections; for example, the convalescent pneumonia patient gives the delayed skin reaction to pneumococcal nucleoprotein (Tillett and Francis), and it is well known that the majority of normal individuals react in the same way to *B. coli* vaccine. The presence of such bacterial allergy in asthmatics therefore is not in itself conclusive evidence that the particular organism producing the biggest reaction is the one responsible for the asthma. At present we have to rely on the clinical history, the absence of skin reactions to non-bacterial idiotoxins, and the bacteriological examination, to guide us in the diagnosis and vaccine treatment of 'bacterial-sensitization-asthma'.

Types of asthma

Clinically, the two main types of asthma discussed above may occur separately or together, with varying predominance of one or other. The following classification is not claimed to be a complete one, but it serves as a guide to the treatment of asthma from the immunological standpoint:—

1. Hypersensitivity to non-bacterial substances.
2. Ditto, plus secondary infections or toxæmias.
3. Bacterial asthma.
4. Ditto, plus secondary non-bacterial sensitizations.

Type 1.—The sensitivities may be single or multiple. Single sensitizations are rather uncommon and the diagnosis is usually readily established from the history and skin tests. Multiple sensitivity is the general rule, though one sensitization may predominate clinically. As the type becomes chronic the sensitivities tend to become more multiple and less distinct, and the constant trauma to the mucous membrane of the respiratory tract encourages the entry of infections to complicate the picture (*type* 2). Alternatively, an infection may convert a subclinical sensitization into an actual one, by lowering the tolerance of the mucous membrane to the specific idiotoxins. The same effect may also take place indirectly—*e.g.*, toxins from a distant focus of infection reaching the lungs *via* the blood stream.

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Type 3.—The asthma results from an infection of the respiratory tract. In the case of nasopharyngeal infections, etc., the asthma is often 'reflex'. The history, bacteriological findings, and the absence of skin reactions to non-bacterial substances establish the diagnosis. The lowering of the vitality of the mucous membrane by the infection may encourage the development of minor degrees of sensitivity to non-bacterial substances of the inhalant type, usually resulting in multiple weak skin reactions (*type* 4). Bacteriological examination reveals the primary cause.

IMMUNOLOGICAL INVESTIGATION OF ASTHMA PATIENTS

Skin tests.—The method of testing employed at the St. Mary's Hospital asthma clinic is the 'prick' method (Freeman; Harley).

A drop of the extract to be tested is placed on the skin of the forearm or thigh and the latter lightly pricked once with a hypodermic needle through the drop at right angles to the surface. The drop is then gently wiped off with a pledglet of cotton-wool. A positive reaction consists of an urticarial weal with surrounding erythema about the site of the puncture, and is fully developed in 10 to 15 minutes. Control tests are performed with normal carbol-saline. Though much stronger extracts are necessary to elicit reactions by the prick than by the intradermal and scratch methods of skin testing, the prick technique is more exact, and as the amount of trauma inflicted on the skin is much less with this method, doubtful and pseudo-reactions are less frequent.

The rapidity and accuracy with which a patient can be tested with a considerable number of extracts make the prick test the best routine method for the clinic.

Bacteriological examination.—This includes (*a*) routine blood-agar plate cultures of swabs of tonsils, nasopharynx, and sputum; (*b*) special examination of fæces, urine, cervix, and other possible foci of infection, if there is any suggestion of an underlying toxæmia, as in cases with feeble skin reactions and normal respiratory tract flora. Tellurite media and anaerobic cultures of the fæces are frequently valuable for the isolation of pathogenic streptococci. In the absence of any obvious pathogens, auto-hæmocultures (pathogen-selective-cultures), which utilize the *in vitro* bactericidal action of the patient's own blood on organisms to which he is immune and allow the growth of pathogenic organisms, often indicate the source of the trouble. Subcultures are made of the predominating pathogenic organisms for vaccine preparation.

TREATMENT

We are not concerned here with the palliative or symptomatic treatment of asthma, the correction of the 'secondary non-specific factors' discussed at the beginning of this paper, or the surgical aspects of focal sepsis, but rather with the treatment of the underlying cause from the immunological standpoint. The success of this type of therapy depends on the accurate diagnosis of the type of immunological mechanism involved in the individual case.

Type 1 *cases.*—If the sensitivity is to a single substance or to a small number of substances which can be removed readily from the patient's surroundings or diet, *specific avoidance* gives excellent results. Specific desensitization is indicated if specific avoidance is impossible or impracticable; the results in selected cases are highly satisfactory.

Type 2 *cases,* with multiple sensitivities and infections or toxæmias, usually respond best to vaccine therapy, with or without the above measures.

Types 3 *and* 4.—The rational treatment is vaccine therapy. Whether a stock or autogenous vaccine is employed, the commencing dose should not be more than 1 million organisms subcutaneously. The dose is repeated at 5- to 7-day intervals, and is cautiously increased till satisfactory results are obtained. After a few months of weekly injections, the interval between doses is gradually increased to one month. The optimal dosage and the length of treatment required vary greatly, but it is usually advisable to repeat the maximum dose at monthly intervals for at least six months to a year. When there is evidence of chronic bronchitis or frequent winter colds a short course of prophylactic injections each autumn is recommended.

CONCLUSION

The tendency of the advanced allergist to consider all asthmatics in terms of skin reactions to non-bacterial substances, and to institute treatment accordingly, produces brilliant cures in certain cases (type 1), but leads to disappointing results where the primary cause is bacterial. I feel this is due partly to the use of the intradermal method of skin testing which frequently produces 'false positive' reactions (that are liable to be misinterpreted by the enthusiast) in the absence of the corresponding *clinical* sensitivities, and to the failure to make a routine bacteriological examination of all patients in whom the skin reactions are multiple and indistinct.

Nutrition in Health and Disease

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MAJOR-GENERAL, I.M.S. (Retd.)

(From the *British Medical Journal,* Vol. II, 26th September, 1936, p. 611)

THIS is an historic occasion. The inauguration of the *Section of Nutrition* is the recognition by the Association that the science of nutrition is an integral part of medicine. Last among the sections, it is not the least; indeed, the day is not far distant when, instead of one morning being devoted to its work, it will rank with the section of medicine as a three-day fixture. For with the rapid increase in knowledge it becomes more and more apparent that the science of nutrition is the foundation of a more rational medicine. It is to be hoped that on future occasions the work of this section will not be limited to physiological, biochemical, pathological, and medical aspects of the subject, but that it will include those that are veterinary and agricultural.

Although young in years the newer knowledge of nutrition has already established contacts with, indeed embraces in its compass, every branch of our profession. It may, therefore, serve as a fitting introduction to to-day's discussion to indicate, though without aiming at completeness, what these contacts are; taking the nineteen other sections, into which the clinical and scientific work of the annual meeting is divided, as the basis of this survey.

First, then, in regard to *Medicine,* which heads the list of the sections, and with which *Public Medicine* and *Diseases of Children* may be included. What contacts has the science of nutrition established with medicine? This question can best be answered by defining 'medicine' and by defining 'nutrition'. For the first definition we may look to a lay, or non-professional, dictionary to find what the public expects of medicine. There it is defined as 'the science or art of the prevention, treatment, and cure of disease'; not merely 'any substance given for the cure of disease'; not merely 'the science of the treatment of disease'; not merely 'that branch of the healing art dealing with internal disease'. It is significant that in this definition prevention takes precedence of treatment and cure. Medicine is, in short, the science and art of maintaining health.

DEFINITION

And what is 'nutrition'? It is a fundamental function on which the condition of the body—that is to say, health—depends. It is not merely 'food' nor 'that which nourishes', as some lay dictionaries define it. Food is the instrument of nourishment; nutrition is the act of using it—the series of co-ordinated processes whereby the nourishment of the body is effected. It consists in the taking-in and assimilation through

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chemical changes—metabolism—of materials with which the tissues of the body are built up, their waste repaired, and their deterioration prevented; by which the processes of the body are regulated and co-ordinated, from which energy is liberated for the internal and external work of the body, and from which heat is generated for the maintenance of its temperature. A primary purpose of the function of nutrition is, thus, to establish and to sustain the structure and function of all organs and parts of the body: to keep, in short, the mechanism of the body in perfect running order. And since health, at its best—for it is a variable state of being—is that condition of body in which all its organs and parts are sound and perform their functions duly, easily, and satisfactorily, it follows that a primary purpose of the function of nutrition is to prevent, so far as its limitations permit, that disturbance or impairment of structure or function of organs or parts of the body which is disease. This, then, is the relation of nutrition to health and disease—the subject of our discussion to-day—the answer to the question: What contacts has nutrition established with medicine?

The older knowledge of nutrition showed the fundamental relations of the energy-yielding constituents of food to vital activities. It showed, also, the importance of the protein factor in nutrition. But it is only within recent years that the equally important relations of certain food-essentials—notably, mineral elements and vitamins—to the structural and functional efficiency of the mechanism of the body have received their due meed of attention. The study of these relations has led to a new conception of causes and origins of disease: a conception which may be summed up in the sequence—faulty food, faulty nutrition, faulty function, faulty structure, faulty health—disease. It is with this newer knowledge of nutrition, and not with the energy requirements of the body, that we are concerned to-day.

FACTORS AFFECTING NUTRITION

Nutrition, as we all know, depends on a number of factors: the constitution of the food, the adequate oxygenation of the blood and tissues, the efficiency of the processes—digestion, absorption, assimilation, circulation, excretion—involved in this function, proper exercise of the body, rest and sleep, freedom from worry and emotional excitement, general hygiene, sunlight, and inherited characters. Chief among these is food of a constitution that provides all the elements and complexes needed for normal nutrition. Moreover, the lack or insufficient supply of one or more of these essentials, or their disproportion one to another, may be the determining cause of some of the other factors that adversely affect the function of nutrition, thus creating a vicious circle. Imperfect oxygenation of the blood and tissues may, for instance, be the outcome of specific food faults. Restlessness and excitement may be consequences of faulty feeding. Food of improper constitution may be the cause of impairment of any of the processes involved in nutrition. Defects in diet may enhance the harmful effects of want of sunlight. Food is thus the greatest of all factors on which the efficiency of the function of nutrition depends. It is the foundation of health; chief amongst the armaments of medicine against disease. 'There may', as Holt aptly expresses it, 'be normal nutrition without normal health, but there cannot be normal health without normal nutrition'.

Here the question arises: what are the materials wherewith the function of nutrition is effected and whence are they derived? They are, so far as is at present known, oxygen, water, and the digestion products of proteins—fats, carbohydrates, mineral elements, and vitamins. There may be others, probably there are. So we are on surer ground when we consider the foodstuffs which, when properly combined in the diet, are known to ensure perfect nutrition and a high grade of physical efficiency and health in human beings. These foodstuffs are: (1) A good whole cereal grain or mixture of whole cereal grains or a good wholemeal bread. (2) Milk and the products of milk—butter, cheese, curds, buttermilk. (3) Egg. (4) Green leaf vegetables. (5) Root vegetables—potatoes, carrots, etc. (6) Legumes. (7) Fruit. (8) Meat. (9) Water. That these provide all elements and complexes, known and unknown, needed for normal nutrition is evident from the fact that they are the ingredients of the national diets of certain races of northern India whose physique and health, when they make use of their national diets in their entirety, are unsurpassed by any other race of mankind. Further, albino rats, when fed on a diet made up of these ingredients, can be maintained in perfect health. Most of these foodstuffs are nowadays classed as 'protective foods'—a discovery made centuries ago by the races referred to, and of which the newer knowledge of nutrition has revealed the importance. If food be the foundation of health, these foodstuffs are its foundation-stones. Using them aright there is little need to concern ourselves too closely with the precise amounts of this or that chemical ingredient of food that may be necessary for normal nutrition. These foodstuffs provide them all and in due amount and proportion one to another. There is, however, this proviso, that they must be produced on soils which are not themselves depleted of essential plant nutrients or of substances, such as iodine, needed for the normal nutrition of man and animals and conveyed to them by plants. 'Les plantes sont les enfants de la terre, de l'air, et du soleil'; and we, in common with other animals, are the offspring of the plants.

Here it may be remarked that important as properly constituted food is at every period of life, it is at no period so important as during infancy and childhood; for then it is that the body is being built, then that defects in its structure and efficiency are so readily established, defects that are at the root of many of the diseases to which man is erroneously supposed to be heir.

BACTERIOLOGY AND PATHOLOGY

So much, then, for Medicine; now as to the contacts of nutrition with bacteriology and pathology. First, as regards the relation of nutrition to resistance to infection. Long long ago, Clausen submitted the available evidence on this question to critical analysis. His general conclusions were as follows:—

'Resistance to infection may be greatly reduced by deficient diet. A deficiency in the diet of vitamin A or of vitamin C appears quite definitely to lower resistance to infection. In certain cases a lack of the vitamin-B complex may also do the same thing. A lack of vitamin D (*per se*) cannot be said to have a proven effect in lowering resistance (such lowering when it occurs is usually due to associated deficiency of vitamin A). It seems probable that the existence of a partial deficiency (of vitamins) may result in loss of resistance to infection.....'.

Under 'deficient diet', as mentioned in these conclusions, there are to be included deficiency of protein and deficiency of certain mineral elements, notably calcium.

The contacts of nutrition with pathology may best be illustrated by the effects of faulty nutrition on the digestive and endocrine systems: the former a highly specialized mechanism designed for the nourishment of the body; the latter a highly specialized mechanism designed for the control and co-ordination of the round of chemical changes (metabolism) on which nutrition depends.

GASTRO-INTESTINAL TRACT

The discovery of the effects of deficient and ill-balanced food on the gastro-intestinal tract is 'one of the most significant contributions to the rôle of nutrition in preventive medicine'. This discovery was made by feeding monkeys on diets having a number of faults—poverty of vitamins and mineral elements and excessive richness in carbohydrates: faults common in human dietaries. 'Deficient foods are in practice usually ill-balanced foods, and the effects of avitaminosis are bound up with maladjustments both in quality and quantity of other essential requisites of the food'. The health of the gastro-intestinal tract depends

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on the adequate provision in the diet of water, proteins, mineral elements, and vitamins. It is unnecessary to enlarge on the functions of water relative to digestive processes. In regard to proteins it is enough to say that they and their contained amino-acids are the source from which hydrolytic enzymes concerned in digestion are derived and from which catalytic agents (glutathione, thyroxine, adrenaline, and insulin) are elaborated. As to mineral elements it needs but to recall that they enter into the composition of all cells, including those of this tract, that they control the permeability of cell membranes, the normal contractility of muscles, and the excitability of nerves, including those of this tract, and, that some enter into the composition of the digestive juices. Their adequate provision is therefore of the first importance to the efficient performance of the functions of the stomach and intestines. Vitamins of the A, B, and C classes have all a profound relation to the structural and functional efficiency of the alimentary tract. Witness the effect of deficiency of vitamin B_1 in impairing the motility of the stomach, with consequent loss of appetite. Witness its effect in impairing gastric secretion and the normal rate of passage of the intestinal residues. Witness the effects of deficiency of vitamin B_2 on the health of the lining membrane of the tract. Witness that of vitamin-A deficiency in favouring infection of it, an effect which it shares in common with deficiency of vitamin-C and of the vitamin-B complex. Witness the congestive, hæmorrhagic and ulcerative lesions produced in it by vitamin-C deficiency. Witness the experimental production by these means in animals of such lesions as gastric dilatation, gastritis, peptic ulcer, enteritis, and colitis. Witness the incidence of gastro-intestinal disease, amounting to 25 per cent of all ailments, amongst insured persons in this country whose diets have so often faults of this character.

Diet and endocrines

Consider the effects of faulty food on the endocrine glands: the sensitivity of the adrenals to deficiency of vitamins B and C; the sensitivity of the thyroid to deficiency of iodine, of certain vitamins, and of protein, and its reaction to certain excesses in the food, as of fats and calcium; the atrophic changes in the pancreas brought about by carbohydrate-rich and vitamin-poor diets; the functional impairment of the reproductive due to certain food deficiencies. Food deficiencies, as I pointed out many years ago, derange both the normal production of hormones and the functional perfection of sympathetic nervous control. Consequently, organs such as those of the digestive system are deprived of the full advantage of that efficient regulation and correlation which normally they would derive from healthy endocrine action. Fifteen years ago I wrote as follows: 'Especially do I direct attention to the effects of food deficiency on the digestive organs and on those endocrine organs concerned in the regulation of metabolic processes. These effects provide the pathological basis for attaching to food deficiencies a prominent ætiological significance in regard to that great mass of ill-defined gastro-intestinal disorders and vague ill-health which throngs clinics at the present day, and concerning which we have hitherto known little or nothing'. I repeat this passage with the greater emphasis to-day, since the intervening years have provided abundant confirmation of its truth.

Obstetrics and gynæcology

Contacts of nutrition with obstetrics and gynæcology are many. It will suffice to mention some of them: the impediments which the effects of rickets and osteomalacia may present to parturition; the relations of food, in particular of fats, mineral elements, and vitamins, to fertility, pregnancy, and lactation; the rôle of linoleic acid (sometimes called vitamin F) in favouring fertility; the probable effect of fat in facilitating the transference of vitamin A through the placenta to the fœtus; the need for an abundant supply of vitamins A, B, and C and of calcium, phosphorus, magnesium, and iron to pregnant and lactating women, and their need for adequate supplies of vitamins D and E and of iodine; the rôle of vitamin E in preventing habitual abortion; the effects of vitamin-A deficiency on the reproductive tract—vaginal cornification, prolonged gestation, difficult parturition, uterine bleeding, variations in size of the placenta, tissue necrosis of the uterine wall—effects which in their turn may favour endogenous or exogenous infection. It is true that these effects have so far been observed only in rats, but is well within the bounds of possibility that they may result in women from similar dietetic causes. It is significant that they occur in rats kept at levels of vitamin-A deficiency insufficient to cause xerophthalmia. All these observations indicate the necessity for the proper feeding of prospective mothers, and of pregnant and nursing women: a necessity as much in the interests of the child as of the mother.

Surgery and anatomy

In regard to surgery little need be said except that the need for it will lessen, certainly in the treatment of internal diseases, when the people learn to feed themselves properly and have the means to do so, and when the profession learns to lead them along the healthful ways of nutrition. The triumphs of surgery—and who would wish to minimize them?—are often the defeats of medicine. But as surgery was resuscitated, not so very long ago, by the application of the principles of antiseptics, so will medicine, now so dependent on surgery, be resuscitated by the application of the principles of nutrition. The relation of nutrition to surgical results, to the healing of wounds, to the mending of fractures, and to chronic bone and joint diseases needs no emphasis.

Coming now to anatomy: what relation has nutrition to this? Clearly an important one, especially in regard to the minute structure of the tissues of the body. 'For however necessary a knowledge of normal structure of organs and parts of the body may be, it is not less necessary to possess a knowledge of the structural changes induced in them by so fundamental a factor as faulty food'.

Physiology

Physiology and biochemistry are so closely interwoven with the science of nutrition that they may be said to be departments of it. Their contacts with it are obvious. To biochemistry has fallen the task of isolating the vitamins; a task it is fulfilling with conspicuous success. There is, however, the risk that in the maze of vitamin and biochemical literature the practitioner of medicine may lose sight of the simple fact that all that the body needs for perfect nutrition is provided in the relatively few foodstuffs already mentioned, if these be consumed in proper quantity and in the form in which nature provides them. Then the questions as to what vitamins, what minerals, what other substances, and how much of them are needed by the body are answered for him and more certainly than by biochemistry.

Nomenclature

Here some reference may be made to the nomenclature of the vitamins. These are still spoken of as 'accessory food factors', as 'anti-this' or 'anti-that' deficiency. The time has come to disencumber them of these limiting descriptive terms. For they are not 'accessories' but essentials, in no way subordinate to the other principles of food. They are substances indispensable to nutrition at every stage in its processes from appetite and the ingestion of food to the evacuation from the body of its waste products; substances without a sufficiency of which normal structure and normal function of organs or parts of the body cannot be maintained; substances as essential to the mechanism of the body as oil is to the mechanism of the car. It is true that they oppose the occurrence of this or that 'deficiency disease'—a term that has also outgrown its usefulness—but they have, as I pointed out many

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years ago, much else to do besides the prevention of these maladies, and this much else is their greater function. The main objection to the continued use of these terms is the impression they convey that because there is no xerophthalmia there can be no vitamin-A insufficiency, or because there is no beri-beri there can be no vitamin-B insufficiency, and so on through the list of 'antis'. It is the insufficiency, the inadequate ingestion, absorption, or utilization of the vitamins rather than their complete absence from the diet (an exceedingly rare event, even in the case of beri-beri) that is of such importance in the practice of medicine. These terms were well enough as props to a dawning understanding of the rôle of the vitamins in nutrition. But now that the edifice of knowledge has come to rest on a sure foundation these props are no longer needed.

PSYCHOLOGY AND NEUROLOGY

Nutrition has a close concern for psychological medicine and neurology.

'The rapid growth of the brain and the development of the nervous system render the growing child peculiarly susceptible to nervous disturbances, whenever conditions of life are such as to interfere with normal nutrition. Most of the neuroses of childhood depend entirely upon disorders of nutrition. The headaches, insomnia, disturbed sleep, chorea, habit-spasm, hysterical manifestations and a multitude of others are relieved only by correcting the faulty diet and habits which are the basis of the disturbed nutrition'.—Holt.

The relation of nutrition to intelligence and backwardness in schoolchildren, the mental disorders in pellagra, the interdependence of physical and mental conditions are other examples of the contacts of nutrition with psychological medicine.

It is now definitely known that deficiency of vitamins A, B_1, and B_2 has important relations to the development and health of the nervous system. A striking example of this truth is that afforded by the tissue-culture work carried out at the Nutrition Research Laboratories, Coonoor. There it was found that embryonic nerve tissue failed to grow normally in the plasma of animals deprived either of vitamin A or of vitamin B. Among the effects on the nervous system of vitamin deficiencies are non-inflammatory peripheral neuritis, degenerative changes in the brachial plexus, sciatic nerves, sensory tracts in the periphery of the spinal cord, posterior columns and posterior nerve roots, Gasserian ganglion, and less commonly in anterior nerve roots and vagus. The nerve changes often present in pellagra in man, as well as the association of vitamin-B_1 deficiency with beri-beri, with some cases of neuritis in pregnancy and, possibly, with alcoholic neuritis, are familiar examples of the contacts of nutrition with neurology.

In the field of ophthalmology the relation of night-blindness—of which there appear to be minor degrees more common in Western countries than was formerly supposed—xerophthalmia, and keratomalacia, to deficiency of vitamin A, is now well established. In connection with it, it may be recalled that the changes brought about by it in the conjunctiva appear to confer pathogenic characters upon otherwise harmless saprophytes present thereon; changes in the soil seem to alter the characters of the seed.

ORTHOPÆDICS AND RADIOLOGY

Orthopædics has contacts with nutritions that are exemplified in the results of rickets and osteomalacia. The fragility of bones, spinal curvature, displacement of vertebræ, diseases of joints, slow and imperfect mending of fractures, all caused, or possibly caused, by faulty nutrition, are other examples of these contacts. Here mention may be made of a case of spondylolisthesis, in a child of well-to-do parents, that lately came to my notice: an example, as it proved to be, of malnutrition in the midst of plenty and of the truth that it is not the food presented to a child but the food eaten and utilized that is of importance. In this case operation by bone-grafting was suggested for the correction of the deformity: a suggestion fortunately not followed; for the child made a complete recovery, as evidenced by an *x*-ray examination, after a year's proper feeding combined with properly directed exercises.

It is in such cases as this and in the detection of rachitic and other bony changes which might otherwise escape observation that radiology comes into touch with nutrition. Physical medicine does not, at present, appear to have any direct contacts with nutrition, yet the use of physical methods in endocrine disorders and in certain maladies that may have a malnutrition basis may not be without significance.

OTORHINOLARYNGOLOGY

Nutrition has a close concern for otorhinolaryngology, particularly in view of the changes brought about in mucous membranes by deficiency of vitamin A. These changes, which I shall have the opportunity to demontstrate to you this afternoon, are such as break down the local defences against infection, and may be of localized or widespread distribution. It is common knowledge that malnourished, weakly, and ill-conditioned children are peculiarly susceptible to inflammatory states of the nose, ear and throat. 'It is almost impossible in winter to keep such children in a hospital ward more than a week or two without their developing rhinopharyngitis, otitis, bronchitis or bronchopneumonia' (Holt): a state of affairs recalling the 'hospitalism' of the dark days of surgery prior to the advent of Lister. Such children frequently suffer from adenoids, which may possibly have a malnutritional basis, for I have myself observed the development of adenoid-like outgrowths in the upper respiratory passages of improperly fed rats.

TUBERCULOSIS AND DERMATOLOGY

Concerning tuberculosis and nutrition, one example will suffice: at the Papworth Village Settlement no child born there during the twenty years of its existence has, while a member of the community, contracted tuberculosis of the lungs, bones, joints, cerebral membranes, nor indeed any clinical form of the disease. Yet these children are the offspring of parents who suffer from tuberculosis and are in constant contact with them. How has this remarkable achievement been brought about? (1) By adequate nutrition, which maintains the child's resistance to infection, and (2) by the absence of mass dose infection—procedures which will prevent many other diseases besides tuberculosis. Here it is necessary to emphasize the relation of faulty nutrition to respiratory disease in general. It is a significant fact that one out of every ten sick persons amongst the insured classes in England and Wales suffers from such disease, and that rats fed on a diet in common use by these persons frequently develop such disease. Deficiency of vitamin A is particularly concerned in bringing this about.

In the domain of dermatology the effects of faulty nutrition on the skin are well recognized; semi-starvation, water deficiency, protein deficiency, mineral deficiency (particularly of iron, calcium, phosphorus, and iodine) and vitamin deficiency (particularly of vitamins A, B, and C) all have harmful effects on this organ and its appendages. Amongst them are dry and inelastic skin, roughening, atrophy, laxness, wrinkling, slow growth of hair, staring hair, loss of hair, slow healing of skin wounds, poor and imperfect cicatrices, furunculosis, ulcers, exudative skin diseases such as eczema and seborrhœa, the skin lesions of pellagra, œdema, xerosis, abscesses, inflammatory conditions at mucocutaneous junctions, the papular condition known as 'phrenoderma', hyperkeratosis, petechial hæmorrhages and other scorbutic skin affections.

THERAPEUTICS

It is in the domain of therapeutics that the newer knowledge of nutrition finds scope for practical application. 'Formerly, in planning the patient's food,

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physicians thought solely in terms of the local pathological condition, of the harm they might do some impaired organ; now they think chiefly in terms of general physiology, of the good they can do the patient as a whole. It is in most cases the patient who must be treated rather than the disease from which he suffers, and in this treatment nothing is so important as maintaining nutrition. Witness the changes that have come about within recent years in the treatment of such conditions as typhoid fever, gastric ulcer, Bright's disease, hypertension, diabetes, tuberculosis, chronic arthritis, and eclampsia: a change based on the fundamental principles of the correction of food faults and the provision in proper amounts and proportions one to another of the various food-essentials needed for the maintenance of structure and function of organs or parts of the body. In the last resort the patient must, with remarkably few exceptions, heal himself, and it is by adequate nutrition that he can best be put in the way of doing so. Here the newer knowledge comes to the aid of the physician, enabling him, by means of refined preparations, rapidly to satisfy the needs of the body for substances that are in default, and thus to hasten cure.

MEDICAL SOCIOLOGY

The importance of nutrition in medical sociology is evidenced by the programme of work before that section at the present annual meeting, wherein it is given a prominent place; it will, then, speak for itself. But I am constrained in this connection to refer again to the remarkable experiences the late Miss Margaret McMillan mentioned in her book—*The Nursery School* (1930). Here she has described the weakly, ill-nourished, and ill-conditioned children of the slums who come for admission to the nursery school at Deptford: children who are rachitic and bronchitic; children with inflammatory states of the nose, ear and throat; children who have adenoids and dental caries. After they have been nurtured and properly fed for a few years they are, she says, almost all cured of any ailments from which they may have suffered on their entrance to the school. They are all straight and well grown, the average child is well made with a clean skin, is alert, sociable, and eager for life and new experience..... 'He does not need to see the doctor or the dentist, and he has none of the minor ailments which affect the children of the slums'. Surely, we have in experiences such as this the root of the whole matter. We now know that large numbers of our people have not the means wherewith to provide themselves with proper food even though they had the knowledge to enable them to judge of what is proper; a state of affairs damnatory of our civilization. But it would be wrong to suppose that poverty is the only cause of faulty nutrition. 'Access to abundance of food does not necessarily protect from the effects of food deficiency, since a number of factors—penury, prejudice, ignorance, habit—often prevents the proper use and choice of health-giving foods'. To these impediments to normal nutrition I would add indifference, neglect, and the weak indulgence of their children by many well-to-do parents who foster tastes and habits detrimental to normal growth, nutrition, and health. Education of the people, the better education of ourselves: these are urgent necessities. It may be that the medical curriculum is already overgrown. If so, let it be pruned, let us teach the student less about 'disease' and drugs and more about 'health', more about nutrition, which is the very basis of health.

MEDICAL HISTORY

I come now to the last of the sections—that of the history of medicine. In this history no chapter is more romantic, more inspiring, more replete with hope for the future of our calling and for the well-being of mankind than that dealing with the newer knowledge of nutrition. Its opening pages tell of the dawning idea of the relation of certain diseases, notably scurvy and beri-beri, to defects in food. These are succeeded by others describing the discovery of vitamins. As the story unfolds the numbers of these and of other elements and complexes, found to be necessary for normal nutrition, increase, and the conception of disease as a manifestation of disturbed structure or functions of the body consequent on faulty feeding and on the faulty nutrition resulting therefrom comes into being. Patient research, the discovery of facts, generalizations from facts, the prediction of fresh facts—its pages tell of these. These are the ways of science; these the ways in which the science of nutrition has been built up.

Reviews

THE QUEEN CHARLOTTE'S TEXTBOOK OF OBSTETRICS.—By Members of the Clinical Staff of the Hospital. Fourth Edition. 1936. J. and A. Churchill Limited, London. Pp. xi plus 674, with 4 colour plates and 291 text-figures. Price, 18s.

A NEW edition of this standard textbook has been published three yearly since it first appeared in 1927. This bears witness to the high standard aimed at and attained by the writers of the book. The 1936 edition contains an important addition in the description of the results of the work on the ætiology of puerperal sepsis by Dr. Colebrook in the research laboratories of the Queen Charlotte's Hospital. The section on the toxæmias also has been brought up to date.

This book represents the teaching at Queen Charlotte's Hospital and is written by members of the clinical staff of the hospital. It differs little in the main from the teaching of obstetrics as practised in other London hospitals and it provides an excellent students' textbook of midwifery. It is clearly written and the illustrations are good. The chapters on antenatal care and the normal and sick new-born babies are fuller than in many textbooks of midwifery. There is a valuable chapter on abdominal pain in pregnancy. The book is essentially practical and it is doubtful if a better introduction to the practice of midwifery could be found. The whole problem of mother and child, attendant and environment is kept in view throughout the book. It can be most thoroughly recommended.

M. N.

A TEXTBOOK OF OBSTETRICS.—By Edward A. Schumann, A.B., M.D., F.A.C.S. 1936. W. B. Saunders Company, Philadelphia and London. Pp. 780, with 581 illustrations on 497 figures. Price, 27s. 6d.

THIS American textbook strikes a British reader 'favorably' by reason of the illustrations which are many and good and have the value of appearing new

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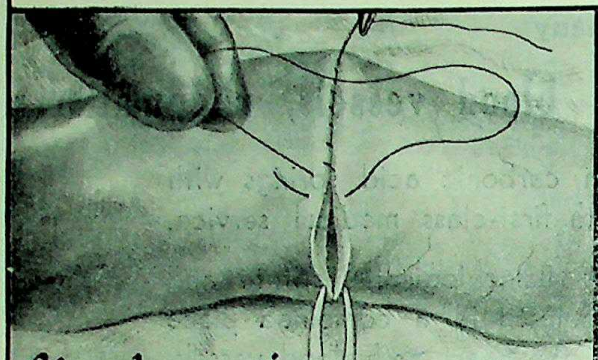
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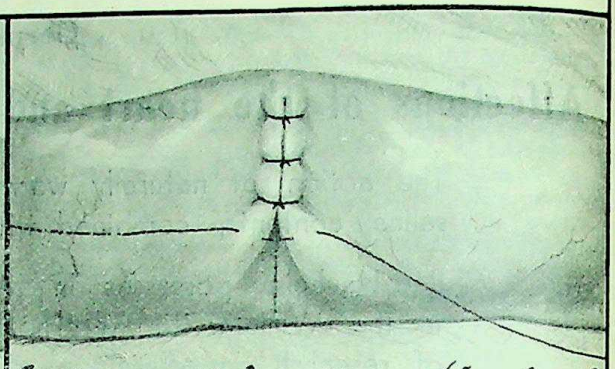
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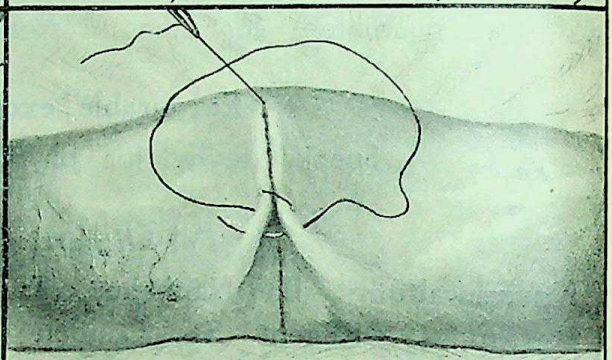
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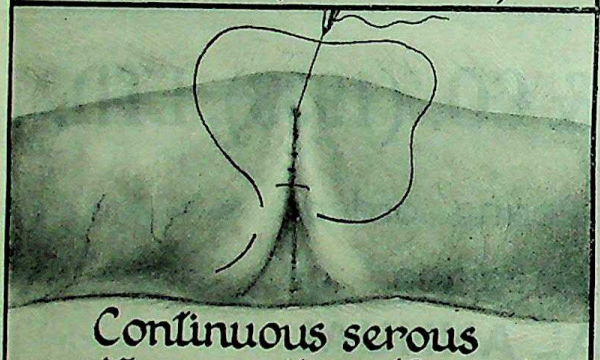
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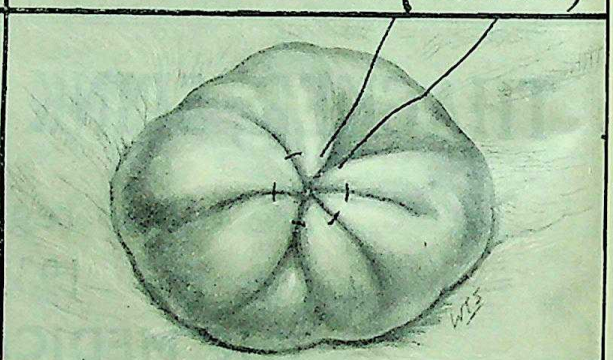
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and better than the diagrams which one is accustomed to expect in textbooks of midwifery.

The book as a whole falls between the students' textbook and the more advanced works on obstetrics. A large section is devoted to development of the fœtus and to obstetrical pathology. The management of pregnancy is given only a very short chapter and the new-born child is dismissed in two pages. One misses reference to the later work on the ætiology of puerperal sepsis but the subject of the toxæmias is discussed at great length.

There is a vast amount of information in this book, but it seems to be presented in a somewhat indiscriminate manner, likely to lead astray any but those with a sound knowledge of midwifery. The opinions expressed are those of an individual and some of them are certainly controversial. The description of the treatment of post-partum hæmorrhage in which the writer so confidently emphasizes the use of packing of the uterine cavity should be read only by the experienced. The teaching on the question of tuberculosis and pregnancy may be true of a country where institutional treatment of tuberculosis is easily obtainable, one doubts whether it could be more widely applied. It is surprising to read that puberty in India is reached at the age of eleven years and in Great Britain at fifteen years. The operation of forceps delivery should, in the opinion of the author, take an hour.

This book is stimulating reading because one so frequently encounters an opinion which seems open to question, but it can only be recommended to those in a position to apply the critical faculty.

M. N.

A TREATISE ON MATERIA MEDICA AND THERAPEUTICS INCLUDING PHARMACY, DISPENSING, PHARMACOLOGY AND ADMINISTRATION OF DRUGS.—By the late R. Ghosh. Fourteenth Edition by B. N. Ghosh, F.R.F.P. & S. (Glas.), 1936. Published by Hilton and Company, Calcutta. Pp. xv plus 724, with 13 illustrations. Price, Rs. 7-8 or 12s. 6d.

THE first edition of the 'Treatise on Materia Medica and Therapeutics' appeared in 1901, nearly 35 years ago. Since then the book has passed through fourteen editions and several reprints. This fact alone bears testimony to the wide range of usefulness and popularity of the book. It is gratifying to note that the present edition (fourteenth edition) under the able editorship of Professor B. N. Ghosh maintains the tradition and the high standard of excellence already set by its predecessors.

Though the original title of the book is retained and the binding and format are generally similar to the previous editions, the present edition is a completely new book from several points of view. The subject-matter has undergone considerable changes with the rapid growth of knowledge of pharmacology and therapeutics. Rational therapeutics is gradually replacing the empirical use of drugs and this tendency is reflected in the section on materia medica where the 'official' preparations are described in more detail and only the more important and commonly used non-official remedies mentioned. Part III deals with the pharmacology and therapeutics of drugs and, in this section, attempt has been made to incorporate the more recent developments in the subject. A few explanatory tracings are included in connection with some of the more important therapeutic agents, but the students would be happier to see more of these tracings. Modern teachers on pharmacology are tending to lay more stress on the subject of chemical constitution and pharmacological action of drugs. Recent advances in organic and synthetic chemistry have clarified many obscure points in this regard and it appears that, if this aspect were attended to more carefully, the teaching of pharmacology would be made simpler and more attractive. It is hoped that, in a future edition, the author will consider giving added emphasis to this side of the question.

Of the many other useful features of the book, mention may be made of the chapter on serum and vaccine therapeutics and the section on Indian indigenous drugs.

We have nothing but praise for this edition and we hope that it will find a place in the library of every practitioner and medical student.

R. N. C.

AN INTRODUCTION TO DERMATOLOGY: WITH A CHAPTER ON THE THEORY AND TECHNIQUE OF X-RAY AND RADIUM THERAPY.—By E. H. Molesworth, M.D., Ch.M. (Sydney). 1937. J. and A. Churchill Limited, London. Pp. xviii plus 520 containing 151 illustrations in the text and references to the coloured plates of Jacobi's Dermochromes and Semon's Atlas of the Commoner Skin Diseases. Price, 25s.

IN the past few years there has been a considerable number of short books on dermatology and when the reviewer received this volume he wondered, before he opened it, if it would prove worth the effort of its production.

On going through it he was pleasantly surprised, for it is an essentially practical production that cannot fail to be of use to the beginner and general practitioner who only has occasional cases of skin disease to treat. The principal manner in which this book differs from similar short books on dermatology is that the author, instead of being content with saying, as most writers do, that so and so 'may be tried', 'has been found of use by some workers', etc., etc., gives the reader the benefit of his own vast experience and if he has found a certain line of treatment no use he does not hesitate to say so. This dogmatism will perhaps lead to criticism as one naturally does not find one's own experience to coincide completely with that of the author of the book. Nevertheless dogmatic treatment of a subject is an advantage in instructing a beginner who is thereby given a point of view from which he can commence to amass his own experience which may perhaps modify his early learning. On this ground this addition to the dermatological books of the British Empire is strongly recommended.

P. A. M.

PAGET'S DISEASE OF THE NIPPLE AND ITS RELATION TO SURFACE CANCERS AND PRECANCEROUS STATES IN GENERAL.—By Dr. Keith Inglis, M.D., Ch.M. (Sydney). 1936. Oxford University Press, London. Pp. 233 with 237 figures. Price, 30s.

THIS is a special work on the particular disease commonly known as Paget's disease of the nipple. As the author has observed in the preface, the book is the result of investigation regarding the morbid histology of Paget's disease. It is very pleasant indeed to observe that the investigation has been carried out in an excellent way and the distinguishing points regarding the nature of Paget's disease have been very clearly elucidated by splendid histological work. As the title of the book denotes, the subject has been studied very thoroughly and allied conditions which clinically appear to be Paget's disease have been included and differentiated from the conditions by histopathological evidence.

The subject has been presented in a scientific way and at the end of each chapter a summary of the discussions has been given. A distinguishing feature of the book is found in the concluding six pages in which the whole subject has been thoroughly discussed and the views of different authorities cited with reference to their respective literature. Lastly, the author's own views supported by unassailable histological evidence have been enunciated. Such a subject, we have no

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hesitation in saying will be an useful addition to surgical pathology.

The whole book is comprehensive and very successful. Its get-up, illustrations (237 in a book of 233 pages) and above all the contents are uniformly satisfactory.

We have nothing but wholehearted praise of Professor Inglis's splendid investigations and his achievements. The only point to which we would like to draw his attention is that he has used the term 'cancer' throughout the text.

M. N. D.

RURAL WELFARE IN INDIA IN 1936.—By C. F. Strickland, C.I.E. Humphrey Milford, Oxford University Press. Pp. 54. Obtainable from Oxford University Press, Bombay, India. Price, As. 8.

MR. C. F. STRICKLAND has brought together in a convenient form the activities of the various organizations in India, governmental and other, which are actively helping the rural uplift movement in the country. The Government of India has made a sum of Rs. 3½ crores available to the provincial governments as grants to assist them in developing rural-welfare work. Some provinces such as Madras, Bengal, Bihar, Orissa and Assam are devoting the bulk of their grants to the improvement of water-supply, sanitation and rural roads. Bombay, the Central Provinces, the Punjab and the United Provinces have already had in progress various schemes for the amelioration of the condition of the agricultural population in the villages. The grants made by the Central Government have therefore helped to stimulate further the activities of these provinces.

Mr. Strickland has rightly drawn attention to four points which are essential if the rural welfare movement is to achieve success. The work of the various departments undertaking a share of the work should be co-ordinated and the necessity for linking together the official and non-official agencies should not be lost sight of, if overlapping and waste of effort are to be avoided. The employment of trained personnel is another important matter. They need not be experts in their own subjects, because experts can be called in whenever necessary. But the rural-welfare workers, men and women, should be trained to appreciate the villager's point of view and to win his confidence. Otherwise nothing can be achieved. A third criterion of success is that the cost should be kept down to the minimum. The fourth and perhaps the most important is that of permanence. The zealous servant of the government or the missionary may, through personal influence, bring about temporary improvements in village life, but lasting results can be achieved only through a change in the outlook of the people. All over the world the experience of reformers is that nothing lasting can be accomplished in less than a generation. The children have to grow up under the new conditions in order that the changes may be assimilated into the life of the people. It is therefore an essential condition for success that the governments and other agencies intent on developing rural welfare in India should be prepared to persevere with their schemes for a period of thirty years.

The work of the various provincial governments and of some of the Indian States has been briefly described, with helpful criticisms at each stage. Nor has Mr. Strickland lost sight of other agencies working in the same direction, such as the Red Cross Society and the Harijan Sewak Sabha under the guidance of Mr. Gandhi. The excellent work done by the Y. M. C. A. in several centres in the country deserves special mention.

Lastly, the questions of debt relief, consolidation of agricultural holdings, child marriage and broadcasting for the education of the rural population and for increasing their happiness have been briefly discussed.

The Indian Village Welfare Association, under whose auspices this small book was published, has been founded in Great Britain for the purpose of stimulating interest in the life of the rural population of India and two similar booklets have already been published for 1932 and 1934. The activities of the Association, which include periodical lectures by persons familiar with village conditions in this country as well as the organization of a 'school' every year at Easter time for persons proposing to undertake work in rural India, deserve commendation, especially when we remember that 89 per cent of the population live in the villages.

CONTRACEPTION AS A THERAPEUTIC MEASURE.—By Bessie L. Moses, M.D. 1936. Baillière, Tindall and Cox, London. Pp. xiii plus 106. Price, 4s. 6d.

THIS book is a report on the medical aspects of the work of the Bureau for Contraceptive Advice which was opened in Baltimore in connection with the John Hopkins University in 1927.

The primary purpose of this bureau was to collect about 1,000 cases of women who required contraceptive advice on therapeutic grounds, to keep careful records for analysis and to obtain data as to the effectiveness of the methods of birth control advised. The patients were referred to the clinic by their own doctors on definite medical indications, and no propaganda was carried out. During the five years in which the bureau operated the data were collected and advice given by Dr. Moses herself with some assistance during the last two years from another woman physician. Careful follow-up work was done at the time of return visits to the clinic, and by letters and home visits if necessary.

One thousand one hundred and fifty-two patients were referred to the clinic, 944 white and 208 negro. The average age at the first visit to the clinic was 30 years and the average number of previous pregnancies was five.

65 per cent of the cases were sent for definite medical reasons of which more than a third was for systemic diseases—venereal diseases and obstetrical indications (such as previous Cæsarean section) and nervous and mental diseases accounted for the majority of other medical reasons. Amongst the other (not strictly medical reasons) were multiparity, indications in the husband, and eugenic reasons.

The method advised in nearly all cases was a vaginal occlusive diaphragm pessary and a spermicidal jelly. A soap and water douche to be used after removal of the pessary was also advised in most cases. The results of advice given were carefully analyzed according to race, intelligence of the patient, continued use of the method, and the occurrence of pregnancy. Approximately 45 per cent of the total number of treated cases attended the clinic and used the method successfully for periods of six months to six years.

Amongst the treated cases in which pregnancy occurred in only 2.7 per cent could this be shown to be due to failure of the method. In the group that became pregnant 71 per cent were of low intelligence. It is stated by the author that no sterility could be shown to have resulted from the use of the methods advised by the bureau.

This report is a valuable contribution to the literature on contraception.

M. N.

PRINCIPLES OF BIOCHEMISTRY.—By Albert P. Mathews, Ph.D. 1936. Baillière, Tindall and Cox, London. Pp. x plus 512. Price, 20s.

THIS is a textbook meant for medical students who have not the time to consult for themselves much of the original literature. As an experienced teacher of biochemistry for nearly 40 years, the author has tried to correlate and synthesize the numerous facts of

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biochemistry and to make them a part of a great science which reveals the co-ordinated chemistry of the human body. The whole subject has been discussed under six main sections: (1) The chemistry and metabolism of the glucides, (2) The chemistry and metabolism of the lipides, (3) The chemistry and metabolism of the proteins, (4) The special chemistry of important tissues, blood and connective tissues, (5) The catalytic agents of growth and development, vitamins and hormones, and (6) The income of energy. The chemistry of the compounds dealt with in each section or sub-section has been discussed clearly and briefly, and the latest views about their constitution have been put forward. This is followed by a discussion of the metabolism of these compounds. All practical exercises have been omitted and references to the literature have been avoided since the author did not intend it to be a reference handbook. The subjects have been presented in a logical sequence which makes the book a very pleasant study instead of appearing as an assembly of facts. The lucid manner in which the subjects have been discussed will profit not only the medical student, for whom it has been primarily written, but also any other reader who is interested in this growing and extremely fascinating science of biochemistry.

S. G.

STEDMAN'S MEDICAL DICTIONARY.—By Thomas L. Stedman, A.M., M.D. Thirteenth Revised Edition. 1936. Baillière, Tindall and Cox, London. Pp. xii plus 1291. Illustrated, and with 22 plates. Price, 35s.

IT is just three years ago since we had the pleasure of reviewing the twelfth edition of this, one of the best of the medical dictionaries.

One of the reasons for the appearance of the thirteenth edition is that many changes have been made in the names used in the new editions of the U. S. Pharmacopœia and the National Formulary. Considerable additions have also been made as the present edition contains 35 pages more than the previous one.

There is little need to review a dictionary in detail and it should suffice to say that the contents of this book maintain the high standard of usefulness of former editions.

P. A. M.

PRINCIPLES AND FOIBLES OF CANCER RESEARCH —IN REGARD TO ÆTIOLOGY AND NATURE.—By Wm. Reinhoff, Sr., M.D., F.A.C.S. 1936. Waverly Press, Inc., Baltimore, Maryland. Pp. vii plus 200

THIS book is a distinctly remarkable achievement for it is a review of the present position regarding cancer research and a summary of practically all the work done on this subject. To the reviewer whose work lies in other directions and so does not allow leisure to follow cancer research in all its details the book was a revelation and the main impression he received while reading it was that cancer research is somewhat like the disease itself in that it has become thoroughly unwieldly and has invaded all branches of medical science, often, as the author of this small volume shows, without any sound reasoning to warrant it.

The first part or preamble is devoted to considerations underlying research in its widest sense including philosophical and metaphysical discussions and might be read with advantage by any medical research worker, at the outset of his career, whatever branch of research he is going to pursue. The second part is more specially devoted to considerations of cancer research, what lines are considered by the author to be worthy of pursuit and indicating where cancer research has wandered from the true path into by-ways that have led or will inevitably lead to dead ends.

It is a book that will excite considerable controversy as all the tenets of the author will not be accepted by every experienced cancer research worker, but it is a useful book as it is an attempt to stem the flood of inconsequential and unscientific researches which at present appear to be cumbering the path of real advance, and if it succeeds in this, even only in part, it will not have been written in vain.

Unfortunately the author has not the power of clear expression so it is often difficult to follow him in his somewhat abstruse reasoning, and this difficulty is not lessened by his habit of giving his references in brackets often right in the middle of a long and obscure sentence.

RECENT ADVANCES IN ALLERGY. (ASTHMA, HAY-FEVER, ECZEMA, MIGRAINE, ETC.).—By George W. Bray, M.B., Ch.M. (Sydney), M.R.C.P. (Lond.). Third Edition. 1937. J. and A. Churchill, Limited, London. Pp. xv plus 517, with 107 illustrations including 4 coloured plates. Price, 15s.

THE subject of allergy has made rapid strides since it first became a matter for intensive laboratory investigation about the year 1920, but its progress does not seem to be slowing down. During the last three years—since the last edition of this very valuable contribution to the subject appeared—no very dramatic advances have been made. Nevertheless, much ground has been covered and a new edition incorporating recent work is very welcome.

We naturally turn to asthma as being the type disease of the group. Here the author is probably at his best, as it is a subject to which he himself has given his whole time for a number of years. His account of the treatment of the disease is as simplified as it is possible to make this very difficult and many-faceted subject. Numerous forms of treatment are mentioned but they are arranged methodically under suitable headings, even if he does fall back on a non-committal expression, such as, 'success has been claimed', rather often. He lays great emphasis on breathing exercises and gives detailed instructions how these may be carried out.

Other sections are equally satisfactory. The book is well referenced and there is an author's as well as a subject-index, and in every way the book is a worthy member of this most excellent series.

L. E. N.

APPLIED PHYSIOLOGY.—By S. Wright, M.D., F.R.C.P. Sixth Edition. 1936. Oxford University Press, London. Humphrey Milford. Pp. xxxii plus 686. Illustrated. Price, 20s. Obtainable from Oxford University Press, Bombay, India.

To the physician, the publication in 1926 of Sampson Wright's *Applied Physiology* was an event of very great importance, as it gave him an opportunity of revising and bringing up to date his knowledge in the subjects in physiology that were directly applicable to his every-day practice, without re-reading his textbooks and wading through the physiological journals. To the post-graduate student studying for higher examinations, it was even more important.

The book was a new departure and one that had a marked effect on medical practice amongst English-speaking people. That was just ten years ago. In the intervening years there have been four new editions and many reprintings of this excellent book, so, it is to be hoped, the author and the publishers have reaped their reward.

There is little that need be said about the present edition except that it has been brought completely up to date. There has been a revision of every section and in some considerable re-arrangement.

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In the chapter on the blood a new coloured plate has been added, and so much recent work has been included in this chapter that, without referring back to a previous edition, one can say that it has been entirely re-written. The author, we are glad to note, emphasises the meaninglessness of the expression 'percentage of hæmoglobin', so frequently used without any mention of the standard, in medical literature.

The book still remains the most valuable non-clinical book that the practitioner can possess.

L. E. N.

Abstracts from Reports

ANNUAL REPORT ON THE WORKING OF THE CIVIL HOSPITALS AND DISPENSARIES IN THE MADRAS PRESIDENCY FOR THE YEAR 1935

Labour cases.—During the year 90,910 normal and 15,913 abnormal labour cases were conducted in all classes of medical institutions, the corresponding figures for 1934 being 84,599 normal and 13,941 abnormal. The increase in the number of labour cases shows the tendency on the part of the female population to come to medical institutions for maternity relief.

Kala-azar.—During the year under report 2,130 cases of kala-azar were treated in all the medical institutions in the Presidency, of which 857, 566 and 490 were treated in the districts of Madras, Ramnad and Tinnevelly respectively.

Tuberculosis.—The total number of patients treated for tuberculosis (tuberculosis of the lung and other tuberculous diseases) in all the medical institutions during the year was 77,412 with 1,413 deaths. The superintendent, tuberculosis hospital, Madras, reports that on an average the period of stay of the cases that improved by treatment was 61 days. Observation of the employees of the government press, Madras, was continued during the year by the director, tuberculosis institute, Madras. The director reports that an attempt has been made for the tuberculosis institute to serve as a centre for after-treatment of cases discharged from other hospitals and sanatoria in the presidency and outside.

Anti-rabic treatment.—During the year 192,269 doses of anti-rabic vaccine have been issued to all the authorized treatment centres in Southern India. The total number of patients who received treatment during the year was 535 at the Pasteur Institute, Coonoor, and 14,084 at all local centres. Thirty-one new centres were opened in the presidency. Twenty-one medical officers were trained at the Pasteur Institute, Coonoor, in the technique of anti-rabic treatment during the year, for the charge of the newly opened centres.

Leprosy.—Steady progress was maintained in the leprosy campaign during the year 1935. Local boards and the public are showing increased interest in the work. The number of clinics at the end of the year was 441, of which 36 were opened during the year. All the government medical institutions and almost all local fund and municipal medical institutions and about 50 subsidized rural dispensaries have leprosy clinics. More clinics can be opened in the subsidized rural dispensaries if facilities are given. Medical officers are becoming less pessimistic about the work and many of them are working whole-heartedly. In some places efforts have been made by feeding them to persuade the poorer patients to be more regular in getting themselves treated. About 40,000 patients were treated during the year and about 809,000 injections were given to them at the clinics. The results in those who persevere in treatment were satisfactory, the chief aim being to arrest the disease. The same 12 leper asylums were functioning with a daily average strength of about 2,100 and with several patients on their waiting lists. They are now adopting the policy of housing the treatable infectious cases only with a view to benefiting them and the community at large by 'hospitalizing' them. The district leprosy councils have been taking some interest in seeing that the work in the districts does not suffer for want of finance by addressing local boards and by stimulating public opinion. The chief leprosy officer in addition to his duties as a group leprosy officer has been co-ordinating the work done in all the clinics and asylums, directing the work of the group leprosy officers and supervising the work in the presidency. As people come to know more and more about the disease better co-operation may be expected.

Venereal disease.—The working of the venereal departments continues to be satisfactory, both in quantity and quality. Five thousand seven hundred and fifty new cases (males) and 1,400 new cases (females and children) were examined and treated in the venereal department of the Government General Hospital, Madras. The average daily attendance in that department consisted of 153 cases, of which 21 were new cases. Nine male doctors were trained in the department during the year. Propaganda by way of distribution of leaflets to the patients attending the department also forms part of the daily routine.

Honorary medical officers.—The Government passed orders on the recommendations of the committee appointed to extend further the system of honorary medical officers and the rules were revised with reference to the committee's recommendations. Applications were invited for appointments of honorary medical officers and they were appointed in many of the medical institutions in this presidency.

Medical education.—During the year under report medical education in this presidency has maintained its reputation and several important investigations and researches were conducted by the staff of the two medical colleges. The year 1935 has been the centenary celebration of the Madras Medical College when His Excellency Lord Erskine, the then Governor of Madras, spoke very highly of the medical education in general and the Madras Medical College in particular. To get the required number of pupils to join the Lady Willingdon Medical School for Women, the Government increased the number of stipends to 15 and also reduced the fees for non-Madrassi students.

THE MISSION TO LEPERS, SEPTEMBER 1935 TO AUGUST 1936

A REVIEW OF THE YEAR'S MEDICAL RETURNS

By JOHN LOWE

(Research Worker in Leprosy, School of Tropical Medicine, Calcutta)

Honorary Medical Adviser, Indian Auxiliary

I HAVE read with interest the medical returns for the year 1935 of the work done by the Mission to Lepers in 43 different stations in India. The figures are impressive—roughly 17,000 patients treated, nearly 9,500 as inpatients and the rest as outpatients, nearly 7,000 patients showing improvement, 1,463 showing arrest of the disease and 771 inpatients discharged, most of them without deformities.

From my personal knowledge of the work of some of these institutions, I can realize what skill, patience and hard work have been necessary to produce these

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results. I know the factors which militate against the production of better numerical returns, the severe cases remaining in institutions many years, and the consequent difficulty of finding room for the admission of many slighter cases which might later help to swell the number reported as arrested or discharged. Nevertheless each year the number of patients treated, and the number of patients showing improvement and arrest of the disease steadily but slowly increase. It is clear that the Mission is giving every possible encouragement to the development of the medical side of the work and that the medical staff and resources of the Mission are being used to very great advantage.

The institutions of the Mission, by isolating and treating so many patients, are doing work of great value from the medical and public health standpoint. Their steady work, year after year, is a very valuable contribution to anti-leprosy work. Other types of work are needed, work on a bigger scale, general propaganda and survey work, outpatient treatment centres, home or village isolation and so on, and to this work the Mission sometimes lends a helping hand, but the adequate maintenance of its own institutions is the most valuable contribution which the Mission can make.

The figures given in the medical report corroborate one's general impression that, when the disease is well established in the body, to get clinical improvement is fairly easy in many cases, but to get arrest of the disease is difficult and sometimes impossible. The limitations of treatment of leprosy are apparent. How can the Mission use its resources and develop its work to the best advantage?

There is an obvious need for increased effort to control the disease in childhood before it has obtained such a hold that arrest is difficult or impossible. Most of the Mission's institutions have homes for healthy children of leper parents and for leper children. Such homes should provide the best hygienic conditions possible and adequate medical supervision in order to give the children the best chance of overcoming slight or latent infections. The extension of this type of work is greatly needed and it is a type of work which can in most places be best undertaken by the Mission. It must, however, not be overdone. It is, I think, wrong to admit children to leprosy institutions and homes unless there is a real necessity for doing so, unless they either have the disease in an active form or else are living in close contact with infectious people and running a grave risk of contracting the disease. There are in India many thousands of such children. Temporary admission of healthy children exposed to infection until it is clear that they are not suffering from the disease, that their physical condition is really good and that some other suitable arrangements can be made for them, and more permanent admission of those who are showing definite signs of active leprosy, might save many of these children. The Mission might very well, during the next few years, concentrate on the further development of this side of their work along sound lines.

STATISTICS OF TREATMENT, 1935

Inpatients

Inmates under treatment at end of year ..	6,597
Inmates who received treatment for three months and upwards	9,420
Much improved	3,101
Slightly improved	2,373
Became worse	464
Had to stop treatment	209
Apparently stationary	766
Died or left	1,070
Cases arrested *without deformity* ..	920
Cases discharged *without deformity* ..	684
Cases arrested *with deformity*	401
Cases discharged *with deformity* ..	87
Cases arrested in a previous year but relapsed during the year	102

Outpatients

Number of outpatients treated ..	6,679
Cases improved	1,139
Cases arrested or became symptom-free ..	142

SIXTH ANNUAL REPORT OF THE ASSOCIATION FOR THE PREVENTION OF BLINDNESS, BENGAL, 1935-36

1. INTRODUCTORY

IN presenting the sixth annual report of the Association for the Prevention of Blindness, Bengal, the committee are glad to report that the activities of the association continue to grow steadily. Unfortunately, progress must of necessity be slow owing to still limited finances. Much however has been accomplished in the year under review, and it is gratifying to know that the popularity of the campaign in the prevention of blindness is more apparent amongst the lay public in Bengal. The committee are very pleased to announce that one of their principal aims has now been achieved, namely, the first travelling eye dispensary which is the first of its kind to be started in India. It owes its existence largely to a gift of Rs. 35,000 which has been presented by the Committee of Their Majesties' Silver Jubilee Fund. This sum represents the budget for maintaining the dispensary for a period of five years. The initial cost of the motor ambulance and its equipment and appliances have been met from the general funds of the association.

The Jubilee Travelling Eye Dispensary started its work on the 28th March, 1936. It has been sent to the Burdwan division and will penetrate into the remotest villages and carry with it the benefits of modern ophthalmology and preach the gospel of prevention. Particulars of the work carried out by this travelling dispensary will be given in next year's annual report.

To medical men who have worked in India it has long been recognized that the great prevalence of blindness in India is due to the backwardness, ignorance, poverty and apathy of large masses of the people. In the villages and even in the towns also there is submerged a great mass of blind people who think themselves and are thought by their relations and friends to be irretrievably blind and who by a small operation could have their vision restored or at least be given a considerable degree of sight. Very commonly these are cases of cataract; cataract comes on early in India, and is often seen in people as young as 30 years of age. The greater proportion of these people could have their sight restored. Some of these go to hospital, especially if they are within fairly easy distance, but very great numbers do not go. They are too ignorant and fatalistic, too timid or perhaps they prefer to wait till the travelling quacks come along to couch their cataracts with disastrous results. Then there are juvenile cataracts which occur in children and the congenital ones which can all be cured by a simple operation performed by an eye doctor. One sees numbers of corneal opacities, a man, woman or child suffers from some kind of ophthalmia which, if it does not destroy his eyes altogether, leaves behind dense opacities and when these cover the pupils and result in blindness. But if, as there often is in such cases, any clear portion of the cornea is left intact, then there is always the chance that by the operation of iridectomy or the cutting of a new pupil in the clear portion of the cornea the sufferer may be restored to a measure of vision. But most of the people in the remote parts of the country do not know this and so they remain blind.

Epidemic dropsy, more commonly but erroneously called by the lay public beri-beri, is extremely common throughout Bengal. It affects all ages; even children do not escape the disease. Glaucoma affecting both eyes is a very common complication and unless treated

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by an eye doctor immediately leads to partial or complete blindness from optic atrophy. Large numbers of people become blind from this terrible disease and yet if they would only undergo a small operation in time their eyesight would not have been lost.

One sees large numbers of cases of entropion, where owing to the effects, generally of trachoma or granular ophthalmia, the eyelashes of the patient are turned into the eye and the cornea is slowly sloughed away. These cases call for operation and can be alleviated in that way and the sight saved.

Then again there are vast numbers of people suffering from inflammatory eye diseases which, if left untreated, will lead to loss or impairment of vision and which from their infectious nature are a source of danger to their relations and friends. Now all these cases of cataract, glaucoma, opacities, inflammatory diseases want ferreting out and helping, and it can be quickly realized to what an enormous benefit a travelling eye dispensary can be in carrying out this work.

Prevention is still more important than the actual curing of eye diseases. For, in addition to the multitude of partly or totally blind people who can have their sight restored by operation or treatment, there is still a very large population who cannot be cured but if they had been seen at an earlier stage their sight would never have been lost and their blindness could have been prevented. It is unfortunately not realized by the public that every day, year after year, the same process is going on, the process of recruiting the ranks of the blind out of the numbers of people suffering from eye diseases which, if not treated, will result in total blindness. There are, according to the census returns, some 600,000 blind in India and it is probable 400,000 to 500,000 need not have been blind if they were properly treated in time, and as the older people die off their places are taken by others and in every generation four or five hundred thousand people go blind who should never have been so.

Ophthalmia neonatorum can be easily prevented by prophylactic treatment which consists in putting 1 per cent silver nitrate into the baby's eyes immediately after birth.

Smallpox is still very common in Bengal and a frequent cause of blindness; smallpox would be non-existent if vaccination and re-vaccination every five years were carried out in all persons.

In matters of prevention as well as in treatment it can be seen of what tremendous use a travelling eye dispensary can be in the villages of Bengal.

Until such time as there are sufficient well-equipped eye hospitals scattered throughout Bengal, and this will take very many years, it is the ambition of the Association for the Prevention of Blindness, Bengal, to have as a minimum five travelling eye dispensaries, namely, one for each division.

2. PROPAGANDA WORK

During the year more coloured posters were prepared and printed and distributed through the Bengal Branch of the Indian Red Cross Society to various hospitals and dispensaries in the province. They were also distributed to medical men and others interested in the movement of prevention of blindness. There was a great demand for these posters and they received great praise from all quarters. It has been found by experience that posters which are simple and colourful attract the interest of the public and are one of the most useful ways of instruction in methods of prevention of blindness.

Magic lantern slides form another important part in propaganda work. The association is well equipped with coloured and simple slides which are excellent. It possesses two magic lantern slide lectures entitled:—

(1) 'Care of the Eyes' with 32 slides.
(2) 'Prevention of Blindness' with 54 slides.

These slides have been made by the Y. M. C. A. Lecture Department, 5, Russell Street, Calcutta, from posters belonging to the association. Copies of these slides can be obtained at a small cost at the above address and copies of the lecture can also be obtained from the office of the Association for the Prevention of Blindness, Bengal, at the Eye Infirmary, Medical College Hospitals, Calcutta.

As mentioned in last year's annual report, the sum of Rs. 1,650 was presented by the Indian Red Cross Society for lectures and educating teachers in the schools and colleges of Bengal, in prevention of blindness. These lectures still continue to be given and are very popular. They are given by trained ophthalmologists under the direction and supervision of the honorary secretary of the association. They are essentially practical and consist of simple methods in prevention and treatment together with magic lantern slide demonstrations. A special syllabus has been prepared and printed for the guidance of these lecturers. They are paid Rs. 10 per lecture, *e.g.*, Rs. 20 for two lectures which constitute a course for each school or college. Difficulty is being experienced in finding the travelling expenses of the lecturers, otherwise lectures and demonstrations could be given in more districts and subdivisions in Bengal. Judging by the letters of appreciation which are being received, these courses of lectures are very popular and supply a much needed want. The lectures are primarily intended for teachers but senior students are also encouraged to attend and they do so in large numbers. A discussion is invited after each lecture and questions explained and answered by the lecturer.

The association is well equipped with booklets on subjects which are important in the prevention of blindness and the care of eye diseases. They are written by ophthalmologists in very simple language and well illustrated. These booklets are being gradually translated into Bengali and Urdu. Requests for copies of the booklets and posters keep coming from different parts in and outside Bengal.

A new cinema film in two reels entitled 'Lamps of Life' has now been completed and is most excellent. This film has been made partly from actual scenes in the Eye Infirmary, Medical College, Calcutta, and partly in the mofussil of the Burdwan district. The association is much indebted to Mr. R. Johnston, I.C.S., District Magistrate of Burdwan, who has taken the photographs and has taken tremendous trouble to make the film a success. The characters are Bengalees and the captions are written in English and Bengali. Copies of this cinema can be obtained from Messrs. Houghton Butcher (Eastern), Ltd., 10, Hungerford Street, Calcutta, at a cost of about Rs. 100.

It is hoped in the coming year to show this cinema freely in Calcutta and copies will be provided for the Jubilee Travelling Eye Dispensary and lecturers in the mofussil. Cinema films are undoubtedly far and away the best method of spreading information on prevention and treatment of blindness.

During the year, epidemic dropsy again broke out in many parts of Bengal. Outbreaks also occurred in parts of Bihar, the United Provinces and Burma. The disease is almost exclusively confined to Bengalees. It is more commonly called beri-beri by the public although it is an entirely different disease. As pointed out in last year's report, glaucoma is a frequent complication of epidemic dropsy and, unless the correct treatment is given, it leads to partial and often complete blindness. It is a disease that can, to a large extent, be prevented and information for its prevention and cure has been disseminated on many occasions through the lay papers and the radio with satisfactory results. Large numbers of patients suffering from epidemic dropsy glaucoma, in all its stages, present themselves at the various hospitals in Calcutta for treatment.

If one visits the various outpatients' departments at the eye hospitals in Calcutta, one sees piteous sights of young, adults, middle-aged and old people blinded by this disease. A booklet on epidemic dropsy glaucoma has been brought out by the association and copies of this can be obtained on request.

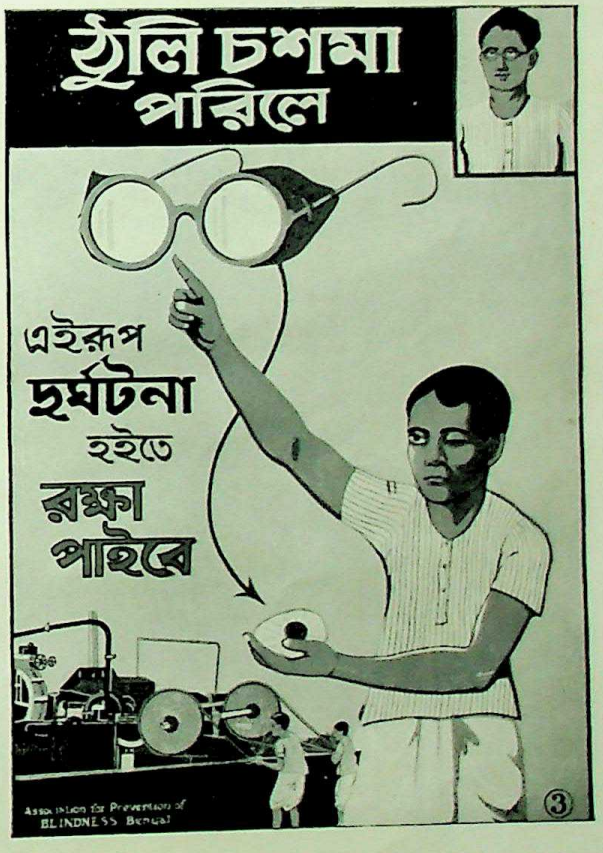
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Four examples of the posters issued by the Association for the Prevention of Blindness, Bengal.

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As in the past the association took a prominent part at the Annual Health Exhibition held in the Museum, Calcutta, and ran the Blindness Stall. Many other health exhibitions held in and out of Calcutta were helped by the association with materials for sections on prevention of blindness.

[The above abstract shows what a live and progressive body this association is, and that in the six years of its existence it has maintained its progress in spite of the fact that this period included the worst years of trade depression when even firmly established charitable organizations suffered severely. The executive of this association is to be congratulated on the manner in which it is steadily expanding its activities and we know of no more worthy object to which the charitably-minded might subscribe, for it is clear from this report that any funds available are carefully and economically spent so that the subscriber can feel assured his money is being expended in full for the object for which it was given.]

ANNUAL REPORT ON THE CIVIL HOSPITALS AND DISPENSARIES IN THE CENTRAL PROVINCES AND BERAR FOR THE YEAR 1935. BY COLONEL N. M. WILSON, O.B.E., I.M.S., INSPECTOR-GENERAL OF CIVIL HOSPITALS, CENTRAL PROVINCES

Dispensaries.—The number of hospitals and dispensaries at the close of the preceding year was 336. During the year 1935 four new dispensaries were opened, *viz,* the private non-aided mission dispensary at Patpara in the Mandla district, the cheap plan dispensary at Fatekherda in the Buldana district, Shrimati Laxmibai Deshmukh Women's Hospital at Murtizapur in the Akola district and the Ramrama Mine Dispensary in the Balaghat district. Owing to the closure of the Pulgaon Mill, the dispensary attached to that mill was closed during the year. Thus, the number of hospitals and dispensaries open at the close of the year was 339, of which 164 were rural and 175 urban.

Taking into account the number of dispensaries at which the public ask for free attendance, the average area covered by a dispensary comes to 476 sq. miles, while the average population works out to 73,846. This is a proof that medical relief in the province is inadequate and the opening of more dispensaries is a necessity for the spread of medical relief in rural areas. But in these days of economic depression deputy commissioners find it very difficult to raise money by private subscriptions to fulfil the conditions for opening cheap plan dispensaries; so unless the economic condition of the villagers shows a decided improvement or the condition of raising a local contribution of Rs. 8,500 on account of endowment fund and half building charges is relaxed, further progress in the matter is not possible.

Mayo Hospital.—The general condition of the buildings which comprise the Mayo Hospital is very poor. There is no modern system of sanitation throughout the building and its area; in consequence, patients are put to great discomfort and inconvenience. There is an inadequate water-supply which is dependent on the local town supply; no system exists of overhead tanks by which the hospital can be regularly supplied with water for drinking and ablution purposes.

The nurses' quarters, even from a low standard, leave much to be desired and in consequence the civil surgeon finds great difficulty in retaining the services of capable and well-trained nurses. The ward equipment which includes blankets and sheets is poor and totally inadequate. In general, the Mayo Hospital, though considered the chief hospital of the province, is far below the standard recognized for a modern hospital.

Distribution of medical personnel.—The strength of the medical personnel working in all classes of hospitals and dispensaries in the province during the year under report was 1,146 (1,089), of which 123 (118) were in the hospitals and dispensaries at provincial headquarters, 692 (648) in those at district headquarters and other urban areas and 331 (323) in those in rural areas.

Nurses.—The staff of nurses at the provincialized hospitals is still inadequate and, as stated last year, unless money is available for providing proper quarters for nurses, no increase in the nursing staff is possible. The three training centres for probationer nurses—the Mayo Hospital, Nagpur, the Victoria Hospital, Jubbulpore, and the Irwin Hospital, Amraoti—continued during the year, while the one at Raipur could not be opened for want of nurses' quarters. Staff nurses were employed at the main hospitals at Saugor, Wardha and Akola.

Honorary physicians and surgeons.—Independent medical practitioners held honorary appointments of physicians, surgeons, dentists and specialists in eye, ear, nose and throat departments at the Mayo Hospital, Nagpur, the Victoria Hospital, Jubbulpore, the Irwin Hospital, Amraoti, the Silver Jubilee Hospital, Raipur, and the Main Hospital, Akola.

Malaria was more prevalent during the year and showed an increase of 80,024 over the figures of the preceding year. The increase was noticed in all districts, excepting Drug.

The number of cases treated for smallpox during the year was 462 (729), of which 84 were vaccinated, 191 not vaccinated, while the vaccinal condition of the remainder was not known.

The local Government has approved of the proposal to establish a tuberculosis clinic at each divisional headquarters of the province and to provide beds at the Union Mission Tuberculosis Sanatorium at Pendra Road in the Bilaspur district.

Financial condition.—The year opened with a cash balance of Rs. 13,40,999, and closed with a balance of Rs. 13,43,010, showing an increase of Rs. 2,011. The total receipts, including the opening balances, amounted to Rs. 26,74,249 (Rs. 25,79,304). The amount of Government contributions paid during the year was Rs. 7,05,737 (Rs. 6,99,898), while the contributions from local and municipal bodies amounted to Rs. 2,92,992 (Rs. 2,49,395). The other receipts items were Rs. 65,717 (67,619) from fees and contributions from patients, Rs. 78,743 (72,185) from funds collected by hospital committees and Rs. 1,90,061 (1,53,963) from miscellaneous sources.

Some of the local bodies have been irregular in the paying of their contributions The present economic depression is largely responsible for this irregularity; unless payments are regular, it will not be possible to run the dispensaries efficiently. The Deputy Commissioner, Wardha, reports that it may be advisable to deduct the amounts of the contributions from the Government grants for general purposes in the case of those local bodies which have made persistent defaults in the past.

Ticket system.—The half-anna ticket system was continued as an experimental measure during this year also at hospitals and dispensaries situated at *tahsil* and district headquarters. The continuance or otherwise of this system will be considered in due course on receipt of reports, regarding its utility, from local authorities. In any case, the time has come when funds should be raised by special taxation for the upkeep of hospitals. The total expenditure during the year amounted to Rs. 13,31,239 (Rs. 12,40,779), which shows an increase of Rs. 90,460.

Silver Jubilee Fund.—The Silver Jubilee of His Majesty the late King-Emperor marks a memorable period in the history of medical activities in this province. The private generosity displayed on this occasion has resulted in the establishment of two women's hospitals in Berar and the carrying out of improvements to existing medical institutions in the province, many of which, starving for want of funds, have been relieved to an appreciable extent.

The Central Provinces and Berar branch of the Indian Red Cross Society has decided to place at the disposal

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of Government a sum not exceeding Rs. 40,000 from its share of the Silver Jubilee Fund partially to meet the cost of the tuberculosis scheme enumerated above. It has also distributed a sum of Rs. 73,695 to various hospitals and dispensaries in the province for the relief of the sick. The Dufferin Fund has decided to distribute from its share of the Silver Jubilee Fund a sum of Rs. 1,66,000 to the different hospitals in the province for the treatment of women and children.

Septic tank latrines.—Literature on septic tank latrines was printed and distributed along with copies of plans to all civil surgeons; in consequence, great strides have been made in the construction of septic tanks for the disposal of sewage at hospitals throughout the province. I hope that this system will be adopted throughout the province and once and for all do away with the appalling corrugated iron latrines which are an eyesore to any institution.

SIXTY-EIGHTH ANNUAL REPORT OF THE DIRECTOR OF PUBLIC HEALTH OF THE UNITED PROVINCES OF AGRA AND OUDH FOR THE YEAR ENDING 31ST DECEMBER, 1935

GENERAL HEALTH OF THE PROVINCE

THE death rate in 1935 in these provinces from all causes showed a decrease of 1.97 as compared with the figures of the preceding year, the rates for the two years being 24.78 and 26.75, respectively, per thousand of population. The decrease was chiefly noticeable under cholera and plague.

In the table appended below have been compared the death rates from the most important diseases and it would appear that 1935 has shown particularly low death rates in a few cases as compared to decennial averages:

Chief causes of mortality	Death rate per mille for 1934	Death rate per mille for 1935	Average death rate for preceding ten years 1925 to 1934	Increase or decrease as compared with 1934	Increase or decrease as compared with decennial average
Cholera	0.66	0.21	0.59	— 0.45	— 0.38
Smallpox	0.31	0.54	0.18	+ 0.23	+ 0.36
Plague	0.98	0.47	0.78	— 0.51	— 0.31
Fever	20.04	19.20	18.45	— 0.84	+ 0.75
Dysentery and diarrhœa ..	0.37	0.38	0.30	+ 0.01	+ 0.08
Respiratory diseases ..	0.96	0.95	0.73	— 0.01	+ 0.22
Injuries	0.43	0.41	0.45	— 0.02	— 0.04
All other causes	2.99	2.61	2.78	— 0.38	— 0.17
All causes	26.75	24.78	24.29	— 1.97	+ 0.49

Cholera.—During the year under report cholera accounted for 10,412 deaths against 31,903 in the previous year. The rates per 1,000 of the population for the two years were, respectively, 0.21 and 0.66 and the quinquennial average was 0.58. The maximum mortality (1,907) occurred in April and the minimum (8) in December.

Anti-cholera scheme.—For want of funds this scheme could not be extended to any more districts than 23 in which it has been in operation for the last several years.

The total quantities of potash permanganate, kaolin and essential oils mixture supplied during the year from the provincial allotments were 44,106, 8,987, and 2,154 lb., respectively.

The scheme regarding early reporting of outbreaks of cholera by patwaris in the districts of Gorakhpur, Basti and Azamgarh has been extended to another year.

Inoculations.—The total number of inoculations performed by different agencies including travelling dispensaries was 207,620—115,026 were performed by travelling dispensaries, 48,674 by district health staff and the remaining 43,920 by other agencies.

Plague.—Twenty-three thousand and nineteen deaths were due to plague during the year under review against 47,688 in the previous year. The rates per 1,000 of the population for the two years were, respectively, 0.47 and 0.98 and the mean for the previous five years was 0.50.

The mortality from plague during the year under report has shown considerable decrease since 1925 excepting the years 1927, 1930, 1932 and 1933.

The highest mortality (6,426) occurred in April and the lowest (54) in August.

Inoculations.—The total number of inoculations performed was 207,991 of which 102,411 inoculations were performed by travelling dispensaries (including reserve and temporary medical officers), 77,286 by district health staff and 28,294 by different agencies. Plague inoculations are now becoming popular particularly amongst educated people.

Evacuation.—Evacuation of infected dwellings as usual proved useful in checking the spread of the disease. Rs. 6,632 were placed at the disposal of district magistrates to assist people in evacuating their houses and for other anti-plague measures.

Rat destruction.—Anti-rat campaign was carried out in 22 districts, 36 municipalities and 6 notified areas. Rat destruction was mainly carried out by means of barium carbonate and rat trapping. In addition to this cyanogas fumigation was also started in the districts of Moradabad, Saharanpur, Muzaffarnagar, Meerut, Bulandshahr and in the municipalities of Meerut, Cawnpore and Hardwar, but had to be stopped for want of funds. The total number of rats killed was 2,167,087. Most of the local bodies appreciated this measure and continued it from their own funds even when the Government grant was not available. It is advantageous to continue anti-rat campaign from year to year as this minimizes chances of outbreaks of plague. Cyanogas fumigation deserves more extensive trial and

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efforts will be made to push it on as funds are available.

Four thousand two hundred and twenty pounds of barium carbonate were supplied free of charge to districts and municipalities and a grant-in-aid aggregating Rs. 6,785 was given to district magistrates and local bodies for expenses on preventive measures.

Disinfection of plague-infected houses was done by means of slow fire or Indian torch flame. This has proved to be the cheapest and most effective measure of disinfection.

Smallpox.—Smallpox was responsible for 26,032 deaths in 1935, against 14,817 in the preceding year. The death rates for the two years were 0.54 and 0.31 respectively, and the quinquennial average 0.18. Of the 26,032 deaths, 6,432 occurred amongst children under one year of age, 9,282 between the ages of one to ten years and the rest among adults. The highest mortality (5,264) was recorded in May and the lowest (260) in October.

Fevers.—During 1935, fevers accounted for 929,298 deaths as compared with 970,289 in 1934, yielding a death rate of 19.20 and 20.04 respectively. The quinquennial average was 18.81. The maximum mortality (101,557) was recorded in June and the minimum (64,167) in December. Malaria was responsible for 813,591 deaths, other fevers for 81,907, measles for 23,460, enteric fever for 8,578, cerebro-spinal fever for 756, influenza for 437, relapsing fever for 213, diphtheria for 105, kala-azar for 101, typhus for 76 and acute poliomyelitis for 74.

Tuberculosis.—During 1935, 5,698 deaths from tuberculosis were registered in the municipalities of the United Provinces against 4,402 in the preceding year. Seven thousand three hundred and twenty-five deaths were returned from phthisis during the year, 6,952 in urban areas and 373 in rural areas.

Dysentery and diarrhœa.—The total number of deaths due to dysentery and diarrhœa during 1935 was 18,283 against 18,140 in 1934. The corresponding death rates for the two years were 0.38 and 0.37 respectively, and the quinquennial average 0.31. The highest number of deaths occurred in May and June, the number for each month being 2,184 while the lowest number (854) was recorded in January.

Respiratory diseases.—These diseases were reported to have caused 46,270 deaths during the year under report against 46,567 in the preceding year, the death rates for the two years being 0.95 and 0.96 respectively. The mean for the previous five years was 0.78. The maximum number of deaths (5,194) was returned in May and the minimum (3,006) in July.

Cerebro-spinal meningitis.—Seven hundred and fifty-six deaths were reported from this disease during 1935—474 from towns and 282 from rural areas.

The disease was found usually to set in suddenly with irregular fever, intolerable piercing headache, repeated vomiting with rigidity in neck and dilated pupils in most cases. Positive Kernig's sign and delirium were also noticed in many cases. Moreover such motor defects as defective hearing and dimness of vision, aphasia, hemiplegia and flaccid paralysis with retention of urine were also observed in a certain number of cases. The unusual and grave complication during the convalescent period of the disease noticed was the development of thyroiditis which proved to be fatal in practically all cases in which it occurred.

The disease, though contagious, was found to be irregular in its distribution. The number of proved cases of direct contagion was very small. Unfavourable living and housing conditions, which are frequently a contributory cause of spread of other infectious diseases, appear to have played a much smaller part in the propagation of cerebro-spinal meningitis. Direct contagion therefore cannot be regarded as a very serious factor.

The majority of the cases occurred in persons between 10 to 30 years of age, than 35 to 45 years of age. Children under two years and persons above 55 years were the least affected. It was observed that people of all communities were susceptible to the disease, but males were comparatively more affected than females. Cases were mostly reported from amongst the poorer classes.

Cases were mostly treated in dispensaries where specific treatment with lumbar puncture and repeated injections of anti-meningococcus serum were given.

Epidemic dropsy (so-called beri-beri).—There were 380 deaths from this disease—339 in urban area and 41 in rural area. The disease, though present in Benares in the month of October 1934, did not attract the attention of the general public till the end of November when cases began to be reported in large numbers. The disease appeared to have been imported into Benares city in the Bengali community from the presidency of Bengal and the neighbouring districts of the Bihar Province. Three hundred and four deaths were returned from Benares city alone.

The onset of the disease was insidious. The disease ran a course of four weeks to a few months. Only in a few cases was the onset sudden and the course less than a week. Generally the disease began with diarrhœa or nausea, which passed off unnoticed. The first warning came on with swelling of the shins which pitted on pressure, shortness of breath, palpitation of heart and low fever. Sometimes there were muscular pains, feeling of weakness or defective vision.

The disease was primarily confined to the Bengali community living in overcrowded, damp and ill-ventilated localities on the river-side wards of the town. It then spread to other communities and a few cases also occurred amongst Mohammedan and non-Bengali communities.

Investigations were made by the local officers to find out the possible causation of the disease. Samples of flour, mustard oil and rice were taken from several big shops and analyzed, but nothing definite could be elicited.

The measures adopted to check the spread of the disease were as follows:—

(1) The houses where cases occurred were disinfected.

(2) People were advised to take plenty of raw tomatoes, green vegetables, *viz,* carrots, peas, turnips, onions, salad and lettuce.

(3) Leaflets giving symptoms and preventive measures were distributed. Posters were also printed and posted in streets and lanes.

(4) Lectures were delivered by the hygiene publicity bureau.

(5) Special attention was paid to the sanitation of the infected localities and sanitary inspectors were directed to keep strict watch on the sale of rotten fish, meat, eggs, fruits and vegetables in markets.

(6) Samples of rice, atta and mustard oil were taken from the various shops of infected areas and sent to the public analyst for examination and report.

(7) Vendors were pursuaded to expose hand-milled rice for sale.

(8) Overripe, decayed and rotten fruits and food articles were destroyed whenever detected.

FAIRS AND FESTIVALS

During 1935, the most important fair was the Magh Mela which was held at Allahabad from 14th January, to 18th February, 1935. The gathering on the chief bathing day (*Amawas*) was ten lakhs. The usual medical and sanitary arrangements, such as inspection of pilgrims travelling by rail and by road, the essential conservancy arrangements in the fair area, etc., were organized and guided by the assistant director of public health. Adequate arrangements for the supply of water were made. The wells in the *mela* area as well as those in Arail and Jhusi villages were permanganated periodically. Articles of food exposed for sale were regularly inspected. Temporary regulations under the Epidemic Diseases Act were enforced in the *mela* area

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and in the Allahabad municipality. The standard of sanitation throughout the *mela* was kept at a very high standard and there was an entire absence of flies during the whole *mela* period. The general health of the pilgrims was excellent. Out of the seven cases of cholera detected in the *mela* area, five were imported. They were all admitted into the infectious diseases hospital. Vigorous measures were taken to check the spread of the disease. The contacts were given essential oils mixture and were inoculated and 621 anti-cholera inoculations were done. The activities of the hygiene publicity bureau in connection with this fair consisted of a public health exhibition, cinema shows and health songs and talks with the aid of loud speakers. Films on the Allahabad Kumbh, cholera, tuberculosis, small-pox, malaria, temperance, etc., were screened. These shows are very popular and attracted large crowds every evening.

The Piran Kaliar Fair was held at Roorkee (District Saharanpur) from 4th to 19th June, 1935. The medical and sanitary arrangements were organized by the district medical officer of health, Saharanpur, under the guidance of the assistant director of public health. Only four imported cases of cholera were detected in the fair area. One of these died and the rest were cured. Adequate measures to check the spread of the disease were taken and no more cases occurred.

The next important fair was the Dadri Fair which was held at Ballia from 7th to 22nd November, 1935. The arrangements of the fair were supervised by the assistant director of public health and the district medical officer of health, Ballia. The gathering at this fair on the chief bathing day was over three lakhs. The sanitary and medical arrangements were organized on the lines of the *Magh Mela*, Allahabad. The health of the pilgrims during the *mela* was good and not a single case of infectious disease was detected.

Analysis of railway water-supplies at important railway stations was also carried out during the important fairs and adequate steps were taken to disinfect water-supplies where necessary.

Maternity and child welfare centres.—One child welfare and three new maternity centres were opened during the year. The total number of centres both maternity and child welfare as well as maternity only at the end of the year was 223 (114 rural and 109 urban) and all these were run by the Red Cross. The Cotton Mills, Cawnpore, and the Dayal Bagh, Agra, also maintained one centre each. The maternity and child-welfare work in the rural areas of the province has received an impetus by the opening of nine modified health units.

The total expenditure during the year under report amounted to Rs. 1,47,886. The excess in expenditure was met from the opening balance of the last year. In addition to this, a sum of Rs. 80,000 was spent on maternity and child welfare work by local branches from local subscription, etc.

The number of medical women employed on preventive work in municipalities and other local bodies was 18.

The number of health visitors with diplomas in the municipalities was 10.

One medical woman (L.M.P.) and two Delhi trained health visitors worked in the Provincial Training Centre, Lucknow. One medical woman (M.B., B.S.) and two Lucknow trained health visitors worked in the Health Unit, Partabgarh.

The number of midwives employed was 293.

The training of probationer midwives was, as usual, carried out at the Provincial Training Centre, Lucknow, in domiciliary midwifery and house visiting. Twenty probationers out of 26 passed examinations during March and September and were awarded certificates by the State Medical Faculty, United Provinces, Lucknow.

Facility for midwifery training also existed in the Cawnpore Maternity and Child Welfare Centre, Dufferin and Mission Hospitals, but these institutions only trained workers for their own needs.

A serious effort was made to train the *dais* throughout the province, specially in 25 maternity and child welfare centres, where medical women or health visitors were employed and in areas under the ten health units in the province.

Six hundred *dais* were trained during the year, of whom 278 were trained in the Partabgarh Health Unit. A sum of Rs. 1,00,000 has been sanctioned from the Silver Jubilee Fund for the building of a health school in Lucknow for the training of health visitors and midwives.

Modified health units were introduced in nine districts during the latter part of the year in connection with rural development work. The scheme in each modified health unit for maternity work consists of—

One health visitor.
Six midwives.
Six trained *dais*.

This work has great possibilities. The rural public is very appreciative of the good and substantial work done by these modified health units.

Correspondence

FOUR MAGGOT-LIKE WORMS REMOVED FROM THE LEFT CONJUNCTIVAL SAC OF A PATIENT

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I am sending you herewith four maggot-like worms removed from the left conjunctival sac of a patient for examination; I hope it will be of interest to the medical profession.

The man experienced severe pain in his left eye at about 2 p.m. on the 10th December, 1936. Next morning at about 8 a.m. when he attended the hospital the lids were found to be œdematous and the conjunctiva congested.

On careful examination two dot-like particles were detected on the upper margin of the cornea and on removal were found to be moving; then two more were detected and removed. The man felt relieved immediately.

Yours, etc.,
R. GHOSE,
Medical Officer,
Semapur Sugar Works.

P. O. SEMAPUR FACTORY,
DISTRICT PURNEA,
11*th December,* 1936.

[*Note.*—No maggots were found in the box received by us from the correspondent; they appear to have been lost *en route*. On the subject of ophthalmomyiasis Dr. D. N. Roy, the assistant professor of entomology at the Calcutta School of Tropical Medicine, comments as follows:—

'Although cases of ophthalmomyiasis have been occasionally reported from South America, Palestine,

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Central Asia, Central Europe, North Africa and Russia, its incidence is by no means common. Almost all the larvæ recorded affecting the human eye belong to *Oestrus ovis*, the common sheep bot-fly. Though the larvæ are normally deposited at the entrance to the nostrils of sheep and subsequently make their way into the nasopharynx, they occasionally deposit one or two solitary larvæ in the vicinity of the human eye and these may either penetrate the mucous membrane of the lid or the lacrymal sac, or may enter the substance of the eye.—EDITOR, *I. M. G.*]

A CASE OF PARAPLEGIA AND HYDROPHOBIA FOLLOWING A FULL COURSE OF ANTI-RABIC TREATMENT

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I have read the interesting note on a case of paraplegia and hydrophobia by Dr. S. C. Sen Gupta, D.T.M., published in the November 1936 issue of your journal. The prescription given therein does not appear to be a scientific one to me. In the first instance, potassium iodide is incompatible with liquor strychninæ hydrochloridi, and secondly, putting liquor strychninæ hydrochloridi (an acid preparation) in the same mixture as liquor arsenicalis (an alkaline preparation) comes to doing injustice to their respective reactions. Books on pharmacology seem to be clear on the subject, but since the prescription was passed uncommented by you, and being a junior practitioner, I am in doubt. I therefore request that I may kindly be enlightened in the matter through the medium of your valuable journal.

Yours, etc.,
KESHAV NATH, L.S.M.F.

ANANTNAG, KASHMIR,
14th December, 1936.

[*Note.*—We are afraid that we overlooked the fact that an incompatible mixture had been prescribed and we stand corrected by this 'junior practitioner'.

Our correspondent does not appear, however, to be so junior that he learnt his pharmacology from the British Pharmacopœia of 1932; he will find in this edition that liquor arsenicalis is a neutral solution.—EDITOR, *I. M. G.*]

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I have read with interest a case of hydrophobia reported by Dr. S. C. Sen Gupta in your November 1936 issue.

The prescription with which Dr. Gupta's patient was treated was wrong. It contained three incompatibles; liquor strychninæ is incompatible with potassium iodide and also with liquor arsenicalis.

Yours, etc.,
MUSHARRAFALI,
Medical Officer in charge,
Sadar Hospital.

HAMIRPUR, U. P.,
4th December, 1936.

Service Notes

APPOINTMENTS AND TRANSFERS

THE Secretary of State for India in Council has appointed to the Civil Branch of the Indian Medical Service the following officers of the Indian Medical Service, with effect from the dates stated against their names:—

Lieutenant-Colonel F. J. Anderson, M.C. Dated 28th July, 1935.

Lieutenant-Colonel N. C. Kapur. Dated 15th November, 1935.

Lieutenant-Colonel H. E. Murray. Dated 22nd December, 1935.

Lieutenant-Colonel R. S. Aspinall, C.I.E., an Agency Surgeon, on return from leave is posted as Civil Surgeon, Sibi and Loralai, with effect from the forenoon of the 19th October, 1936.

Major Ajab Singh Garewal is confirmed in the Central Provinces Jail Department, with effect from the 14th August, 1935.

Major G. Verghese is confirmed in the Bihar Jail Department, with effect from the 13th December, 1935.

On reversion from foreign service under the Indian Research Fund Association, Captain J. R. Dogra is appointed as Supernumerary Officer at the Haffkine Institute, Bombay, with effect from the date on which he assumes charge of his duties.

The services of Captain Ilahi Bakhsh are placed temporarily at the disposal of the Government of the Punjab, with effect from the afternoon of the 25th September, 1936.

The services of Captain R. L. Raymond are placed temporarily at the disposal of the Government of Burma, with effect from the forenoon of the 5th November, 1936.

The services of Captain A. E. Kingston are placed temporarily at the disposal of the Government of Burma, with effect from the afternoon of the 11th November, 1936.

Captain G. F. Taylor, an Officiating Agency Surgeon, is confirmed as an Agency Surgeon under the Government of India in the Foreign and Political Department, with effect from the 18th December, 1935.

Captain F. W. Allinson is placed on general duty at the Medical College Hospitals, Calcutta, with effect from the 16th November, 1936.

Captain F. W. Allinson, on general duty at the Medical College Hospitals, Calcutta, is appointed as Civil Surgeon, Midnapore, *vice* Captain E. G. Montgomery, transferred.

LEAVE

Lieutenant-Colonel J. C. Pyper, O.B.E., an Agency Surgeon, is granted leave on average pay for 8 months combined with leave on half average pay for 4 months, with effect from the afternoon of the 10th October, 1936.

Lieutenant-Colonel R. L. Vance, an Agency Surgeon, is granted, on medical certificate, leave on average pay for 21 days combined with leave on half average pay for 3 months and 9 days, with effect from the 1st November, 1936.

PROMOTION

Majors to be Lieutenant-Colonels

R. Sen. Dated 7th August, 1936.
L. G. Pearson. Dated 18th November, 1936.
P. M. Antia. Dated 23rd November, 1936.

Note.—The promotion of Major S. L. Patney to the rank of Major is ante-dated to 2nd February, 1929. He qualified for accelerated promotion on 13th October, 1936.

The seniority of Lieutenant J. G. Thomson is ante-dated to the 1st May, 1935.

RETIREMENT

Lieutenant-Colonel J. B. Hanafin, C.I.E. Dated 23rd October, 1936.

RESIGNATION

Captain J. D. Gray resigns his commission. Dated 3rd September, 1936.

RELINQUISHMENT

Lieutenant E. N. Brockway relinquishes his probationary appointed. Dated 24th September, 1936.

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Notes

ERGOMETRINE B. D. H.

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In March 1935 Drs. Dudley and Moir announced the isolation of a new alkaloid possessing the clinical properties previously described by Moir. This newly-discovered alkaloid has been named Ergometrine by Dudley and Moir.

Simultaneously A. K. Koff and Marvin R. Thompson, by dividing ergot extracts into alkaloidal fractions and non-alkaloidal fractions, found that the quickly-acting substance was contained in the alkaloidal fraction, and that it remained there after the removal of the previously-known alkaloids of ergot. It was considered, therefore, that the immediate contraction that follows the oral administration of certain liquid preparations of ergot is due to some hitherto undiscovered alkaloid of ergot, or at least to some principle contained in the *'residual alkaloid'* of ergot.

Thus was provided the key to the solution of the problem which has been the subject of investigation for so many years of the difference between the clinical action of liquid extracts of ergot of rye and of the salts of the pure alkaloid ergotoxine.

Further, as was indicated by the earlier results of Moir, there is a striking difference between the action of ergometrine and the previously-known alkaloid of ergot—ergotoxine. The latter alkaloid, administered in doses of 2 to 3 milligrammes, provokes uterine contractions only after an interval of thirty-five minutes or more, and even these delayed contractions are erratic and somewhat feeble in character. Ergometrine, on the other hand, administered orally in a dose of 0.5 to 1 milligramme causes strong contractions which occur in six and a half to eight minutes after administration. The onset is sudden and accompanied by pronounced uterine spasm, which appears to be caused by a succession of contractions so rapid that the organ as a whole has no time to relax. This stage lasts for about an hour and is followed by a second stage, during which the uterus shows regular, vigorous, isolated contractions, continuing for an hour or more.

It is observed from the foregoing that ergometrine will prove of immense value in obstetrics, particularly on account of the fact that within six and a half minutes of the oral administration of a relatively small dose of it there is produced with unfailing regularity the same effect as that which hitherto has been obtained with so much uncertainty by the administration of the variable liquid extract of ergot.

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Original Articles

RADIOLOGICAL AND LABORATORY INVESTIGATIONS OF CHRONIC GASTRO-INTESTINAL DISTURBANCES IN THE TROPICS

By R. N. CHOPRA, C.I.E., M.A., M.D. (Cantab.), M.R.C.P. (Lond.)
BREVET-COLONEL, I.M.S.
Honorary Physician to H. M. the King
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and
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(*From the School of Tropical Medicine and Carmichael Hospital for Tropical Diseases, Calcutta*)

CLINICIANS in the tropics admit the existence of a group of chronic 'bowel' conditions in which a definite diagnosis cannot be made by the ordinary methods of examination. The majority of the patients belonging to this group have suffered in the past from chronic dysentery, either bacterial or protozoal in origin, and show diverse and often vague symptoms such as indefinite pains in the abdominal region, indigestion, flatulence, irregularity of the bowels, etc. In a number of them non-lactose-fermenting organisms such as *Bact. pseudo-carolinus, Bact. asiaticus, Salmonella morgani* are detected; in others cysts of *Entamœba histolytica,* Charcot-Leyden crystals, flagellates such as *Giardia intestinalis* or *Trichomonas hominis* are found; in others helminthic parasites are discovered in the stools. Although it is natural at first to attribute the patients' symptoms to the particular infection found, it has been often observed that symptoms in many do not abate in spite of the eradication of such infections. The disturbances in these patients are, therefore, often put down as functional in nature or a vague term such as 'chronic dyspepsia' is used in their diagnosis. On going into the history of these patients it will be found that they are chronic sufferers who have been treating themselves with 'stomach powders', 'liver pills', 'salts', and have even received courses of emetine from their medical attendants, but with little or no permanent relief or benefit. The trouble goes on for years and some of them are described by their medical attendants as suffering from neurasthenia, a term used to cloak our ignorance in the tropics as often as anywhere else. We believe, that there is no such condition as neurasthenia without a definite organic lesion of some kind which is the source of irritation in some part of the body. The intensity of the symptoms produced varies with the degree of sensitiveness of the individual to the irritative stimuli from this source. The symptoms thus produced are reflex in origin and the sufferings of the individual may sometimes be severe, but frequently there may be periods of intermission, when the patient feels comparatively well and may even think he is cured. A careful clinical examination of these patients shows that the classical textbook signs and symptoms of a definite gastro-intestinal lesion are, as a rule, absent. Some of them have been shown to have definite surgical lesions which are likely to be overlooked in ordinary examination. Such patients are seldom thoroughly enough investigated for a proper diagnosis to be aimed at even in hospitals, to say nothing of the private practitioners, as laboratory facilities for such detailed investigation are often not available. These patients, therefore, go on suffering for years till anæmia, emaciation or other complications and sequelæ supervene.

During recent years the senior author has had under his care a series of such cases in the Carmichael Hospital for Tropical Diseases, that were thoroughly investigated from every aspect. Besides detailed and thorough bacteriological and protozoological investigations, examination by *x*-rays after an opaque meal is essential in many of these cases to locate the lesion, and in this paper we give the result of the analysis of 80 patients in which this procedure was adopted.

Before discussing the results of the radiological examination we intend to go a little more into the symptomatology of these patients. As stated before, the symptoms were mostly of a subjective nature and they might be classified under three main heads, namely, abdominal pain and tenderness, gastric symptoms and intestinal symptoms.

(1) *Abdominal pain.*—Out of 80 patients 43 complained of pain in some part of the abdomen. A large number of the patients, 18 in this series, complained of pain in the epigastrium, nine had pain in the cæcal region and 16 in other parts of the abdomen. Three patients had definite hunger pains and three others complained of griping and tenesmus such as are seen in acute dysentery. On palpation, tenderness and rigidity of muscles were elicited in 19 patients and out of these 11 had it in the region of the cæcum and ascending colon, five in the left side of the abdomen and three in the epigastrium. The large bowel showed thickening in some of them.

(2) *Gastric symptoms.*—These consisted chiefly of a feeling of heaviness after meals, heartburn, acid eructations, loss of appetite, nausea and occasional vomiting. Thirty-six patients in this series suffered from one or other of these symptoms.

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in their stools. Two patients had melæna and two occult blood in their stools. Flatulent distension was a common feature in 30 patients and often it was most distressing, the patient getting 'blown up' and the heart being secondarily affected by pressure.

The main radiological findings may be summarized as follows :—

(1) In one group, irregularity of the outline of the duodenal cap, pyloric spasm and filling defects were frequently seen, and in a few cases definite craters with barium content were found several hours after the stomach was empty. Duodenal distension with spasm and catarrh was often seen. Some of these patients undoubtedly had duodenitis and others showed signs of active or healed ulcers. In one patient, not included in this series, we found a diverticulum in the region of the duodenum.

We may also note here a condition which was not infrequently met with in a number of the patients and that was hurrying of the meal through the small intestines. In a few hours the meal passed through the small gut, and reached the hepatic or the splenic flexure.

(2) In another group, the appendix was visualized for long periods, that is up to 72 hours after the meal—sluggish appendix. It was sometimes abnormally long, was distended, had constrictions in it, showed the presence of concretions and was often adherent to the cæcum. Such cases were classed as pathological appendix. The cæcum was frequently mobile and showed signs of ulceration or catarrh, which sometimes extended all the way down to the pelvic colon. Thickening and spasm of the colon were frequently seen.

(3) In the third group, abnormal delay in emptying, distension of the cæcum and the colon, often with marked visceroptosis, diverticulitis, stagnation of the contents and catarrh were the main features. In some of the cases the colon still retained the meal after 48 hours or longer. These cases were classified as intestinal stasis.

(4) In the fourth group, loss of muscular tone of the wall of the whole of the gastro-intestinal tract was seen and there was abnormal retention of contents. In some, visceroptosis was marked; the stomach, the small intestines and the transverse colon all seemed to be lying in the pelvis.

(5) In the fifth group there were definite signs of inflammation or ulceration in some part of colon, accompanied by excessive gas formation. In others there was abnormal irritability of the large gut and residual strings or streaks of barium were visible.

Classified according to what was considered to be the main radiological diagnosis, the patients could be grouped as follows :—

(1)	Duodenal ulcer and duodenitis ..	16
(2)	Pathological appendix ..	21
(3)	Stasis of the intestine ..	26
(4)	Atony of the gastro-intestinal tract	32
(5)	Ptosis	7
(6)	Catarrh	13
(7)	Colitis	4
(8)	Normal	13

The patients rarely suffered from any one of these conditions singly, a combination of these being the rule. The details are given below in a tabular form.

TABLE

	Total	Duodenal ulcer	Pathological appendix	Stasis	Atony	Ptosis	Catarrh	Colitis	Normal
Duodenal ulcer ..	16	..	3	2	3	..	1	..	..
Pathological appendix ..	21	3	..	4	6	..	4	..	..
Stasis	26	2	4	..	13	3	3	..	..
Atony	32	3	6	13	..	4	5	1	..
Ptosis	7	..	..	3	4	..	..	..	..
Catarrh	13	1	4	3	5	..	..	..	..
Colitis	4	..	..	..	1	..	..	..	..
Normal	13	..	..	..	..	..	..	..	..

The various symptoms in relation to the different radiological findings will be better understood from the following descriptions :—

Pain.—Of the 16 patients in whom signs of ulceration were visible, only three had definite hunger pains. Six patients had pain in the epigastrium, without any definite relation to food. Two patients who complained of pain in the right iliac fossa also had pathological appendix. Some of these patients underwent operation and the diagnosis was confirmed. In those who had intestinal stasis, pain was a common symptom. Out of 20 cases in this series, 14 had it in some part of the abdomen. Of the ten patients who showed signs of atony of the gut only three, *i.e.*, those in whom ptosis was present, complained of pain, which was confined to the upper part of the abdomen.

Gastric symptoms.—Out of 80 patients, 36 had symptoms referable to the stomach. Of these, 13 were found to be suffering from some lesion in the duodenum. When intestinal stasis was present gastric symptoms were also a common feature.

Intestinal symptoms.—Flatulent distension of the abdomen, constipation or constipation

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alternating with diarrhœa, was a common feature among those patients in whom the skiagrams revealed a condition of loss of tone or a condition of intestinal stasis due to spasmodic contraction of the large gut. Out of the total 80, 23 had looseness of the bowels; as might be expected many of these had colitis and catarrhal condition of the bowels, but quite a number, seven in this series, showed involvement of the appendix and were diagnosed as pathological appendix. Banerji, Chopra and Ray (1936) have fully discussed these cases elsewhere. What we wish to stress here is that in those patients in whom the appendix was not cleared of the opaque meal after 24 hours (sluggish appendix) while the cæcum and ascending colon were empty, a pathological appendix was suspected, and those in which the appendix still retained the meal after 48 hours and longer a definite diagnosis of pathological appendix could be made. These results were confirmed by operation in a number of cases.

Thirty-three patients passed mucus in their stools, being generally those whose stools were diarrhœic, though there were a few who passed streaks of mucus with constipated stools. Mucus was frequently observed in the stools of those in whom the appendix was pathological; it also occurred in those who had colitis and atonic or spastic conditions of the gut. Those who had acute colitis often passed both mucus and blood in their stools. The only case of duodenal ulceration that passed mucus and blood had an *E. histolytica* infection.

Of the patients who gave a history of melæna, one showed signs of duodenal ulceration, which was confirmed by radiological examination. In the other cases, no lesion was detected in the gastro-intestinal tract. The two cases with occult blood had heavy hookworm infections.

Anæmia was a common symptom in this series, 22 patients suffered from it. Of the four patients who showed a rise of temperature above normal while in hospital, two had malaria. The liver was enlarged in five cases of which three had *E. histolytica* infection.

A detailed microscopical and cultural examination of the stools was done in all this series. Five patients were found to be suffering from hookworm infection. *E. histolytica* was found in the stools of eight patients.

The bacterial organisms of doubtful pathogenicity, which were found in the stools by culture, are given below :—

Non-lactose fermenters—

(1)	*Bact. pseudo-carolinus* ..	16
(2)	„ *alkaligenes*	14
(3)	„ *morgani*	4
(4)	*Ps. pyocyanea*	4
(5)	*Bact. asiaticum*	4
(6)	„ *para-asiaticum* ..	4
(7)	„ *pseudo-asiaticum* ..	2

(*Continued at foot of next column*)

INDIVIDUAL VARIATIONS IN THE EFFECTIVENESS OF SYNTHETIC ANTIMALARIAL DRUGS (A PRELIMINARY NOTE)

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and
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THE disadvantage of treating malignant tertian malaria with quinine or atebrin alone is

(*Continued from previous column*)

(8)	*Bact. lunavensis*	1
(9)	„ *metalkaligenes* ..	1
(10)	„ *douglasi*	1
(11)	„ *paratyphosum* ..	1
(12)	„ *pritnitzi*	1

Late lactose fermenters—

(1)	*Bact. belfastiensis*	1
(2)	„ *metadysentericum* ..	2

Others—

(1)	*Strept. fœcalis*	1
(2)	Staphylococci	2
(3)	Monilia	2

Summary

A series of 80 cases with chronic gastro-intestinal disturbances admitted under the senior author were investigated by radiological examination. Many of them originally had dysentery, which was later complicated with other pathological conditions of the bowels. Symptoms were variable, the chief being abdominal pains, distressing flatulence and irregularity of the bowels, which had lasted for prolonged periods and which were not controlled by ordinary methods of treatment. This is the class of case which often comes under the category of functional or neurasthenic. Nothing but a thorough laboratory and radiological examination could have diagnosed these cases. The commonest cause was stasis and atony in 37.5 per cent in this series. Other causes were pathological appendix, duodenal ulceration, and colitis, in the order of frequency. Thirteen patients showed normal appearance of the gastro-intestinal tract.

It was observed that in patients in whom the appendix still retained the barium meal after 24 hours the organ was not normal. In those in which the meal was still retained after 48 hours the appendix was definitely pathological and many of these cases showed constrictions and concretions. These observations were confirmed in a number of patients after operation.

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that neither of these drugs has any effect on the viability of the gametocytes of *Plasmodium falciparum*. In fact, the administration of quinine in some cases brings about an increase in the number of crescents in the peripheral blood. The necessity for a drug, possessing crescenticidal properties has therefore been felt for a long time. It was thus a great event when the synthesis of plasmochin was carried out by Schulemann and his co-workers in 1926. The literature regarding the action of this drug is enormous and there is no doubt that it produces a marked and rapid destructive action on the gametocytes of *P. falciparum*.

Knowles and Das Gupta (1931) worked out the minimal lethal dose of plasmochin for the gametocytes of the Indian strains of *P. falciparum*. They have shown that a total dosage of 0.04 gm. to 0.06 gm. of the drug is sufficient to eradicate all the sexual forms from the peripheral blood, even when the infestation is a very heavy one. These conclusions have also been borne out by Clemesha (1933). This dosage should be administered by the mouth, giving 0.01 gm. of the drug twice daily for two to three consecutive days. Within 24 hours of administration of plasmochin the gametocytes swell up and become irregular, the chromatin breaks up by karyorrhexis and the crescent stains very badly. In 48 hours, many of the gametocytes present in the film are almost unrecognizable and they finally disappear from the peripheral circulation.

In the literature, few cases of resistance to plasmochin are on record. In the Carmichael Hospital for Tropical Diseases we have had opportunities of treating and observing carefully a large number of patients with *P. falciparum* infection showing gametocytes in their blood, and we have found that the total dosage of 0.04 gm. of plasmochin as a rule succeeded in eradicating the gametocytes altogether from the peripheral blood, however large their number may be. Only in a few instances was a dosage of 0.06 gm. necessary.

We were therefore somewhat surprised when, in a patient recently admitted under the senior author into the Carmichael Hospital for Tropical Diseases and showing a heavy infection with the sexual forms of *P. falciparum*, the crescents persisted even after administration of 0.095 gm. of plasmochin, and a total of 0.135 gm. had to be given before they disappeared from the peripheral blood. This patient belonged to the series in which we were testing the effect of combined atebrin and plasmochin dragées (Bayer) on the Indian strains of malaria, and the details of this case are as follows :

Case I.—S. M. K., aged 31, was admitted into hospital on 3rd September, 1936, with the history of malarial fever off and on for the last three months. He was emaciated, slightly jaundiced and his spleen was palpable about an inch below the costal margin. Examination of the blood revealed the presence of malignant tertian rings and crescents. The laboratory findings and treatment are described below:—

Date	Laboratory findings	Treatment
4-9-36	Scanty M. T. rings and crescents.	
7-9-36	Do.	Atebrin 0.1 gm. and plasmochin 0.005 gm., t.d.s.
8-9-36	Crescents	Do.
9-9-36	Do.	Do.
10-9-36	Do.	Do.
11-9-36	Do.	Do.
12-9-36	Scanty crescents	..
13-9-36	Do.	..
14-9-36	Do.	..
15-9-36	Do.	..
16-9-36	Do.	Plasmochin 0.01 gm., b.d
17-9-36	Do.	Plasmochin 0.02 gm., b.d
18-9-36	*Nil*	..

Laboratory examination.—Aldehyde test—negative; antimony test—undiluted + and diluted (1/10) —; lævulose tolerance test—normal before and after treatment with the combined preparation of atebrin and plasmochin; van den Bergh test—direct —, indirect ±, before and after treatment. Stool examination showed the presence of *Trichomonas hominis, E. nana* cysts, *Bact. morgani* and *Bact. para-asiaticus*.

The drug was administered by the mouth in the form of tablets each containing 0.1 gm. of atebrin and 0.005 gm. of plasmochin three times a day. The results puzzled us a good deal at first. We then started testing the urine for the presence of these drugs in order to see if any absorption was taking place. There was no difficulty in testing the presence of atebrin but we found the detection of plasmochin was not so easy. In a series of cases in which dragées were given, the urine was tested as a routine for the presence of atebrin, and parasites in the peripheral blood were also examined daily with a view to seeing what effect was being produced on them. Our intention in describing these cases is to bring out the fact that the question of absorption and excretion is an important factor in drug therapy and should never be lost sight of in cases where the expected results are not attained. Plasmochin is a toxic drug and as, in the case described, no such symptoms were noticed even with a dose much higher than the ordinary therapeutic dose, it is likely that the normal absorption of the drug was interfered with.

Case II.—A. U. S., aged 16, was admitted into hospital with the history of malarial fever for three months. He was anæmic and slightly emaciated and the breath

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sounds were slightly diminished on the back. He gave a history of chronic irregularity of the bowels and occasional attacks of epistaxis. His spleen was tender and palpable about 2¼ inches below the costal margin. Examination of the blood revealed the presence of scanty malignant tertian rings.

Date	Malaria parasites	Treatment	Remarks
21-11-36	Scanty M. T. rings.	Atebrin 0.1 gm. and plasmochin 0.005 gm., t.d.s.	
22-11-36	Do.	Do.	
23-11-36	Do.	Do.	
24-11-36	Do.	Do.	
25-11-36	Do.	Do.	Urine shows no atebrin. No effect on temperature.
26-11-36	Do.	Atebrin 0.1 gm., t.d.s.	
27-11-36	Do.	Do.	
28-11-36	Do.	Do.	
29-11-36	Very scanty M. T. rings.	Do.	
30-11-36	No parasites	Do.	Urine: appreciable amounts of atebrin.
1-12-36	Do.	..	Do.

Other laboratory findings.—Hookworm 700 eggs per c.cm.; urobilin present in the urine; van den Bergh indirect +, direct —; R. B. C. 3,300,000; hæmoglobin 62 per cent.

It will be observed that after a full five days' course of the atebrin and plasmochin dragées the asexual forms still persisted and the urine did not show the presence of atebrin. The patient was then put on atebrin by itself to see if the combination was at fault. The drug was detected in his urine in small quantities, and the asexual parasites disappeared from the peripheral circulation. The patient suffered from chronic gastro-intestinal trouble and had hookworm infection. It would appear that whereas the drug from the combination dragées was not absorbed at all in this case, atebrin by itself was absorbed with difficulty.

Case III.—K. N., aged 15, was admitted into hospital with the history of malarial fever for five months. He was anæmic, slightly icteroid and his spleen reached the level of the umbilicus. Examination of the blood showed the presence of a moderate infection of benign tertian malaria.

Date	Malaria parasites	Treatment	Remarks
25-11-36	B. T. rings, trophozoites.	Atebrin 0.1 gm. and plasmochin 0.005 gm., t.d.s.	
26-11-36	Do.	Do.	
27-11-36	Do.	Do.	
28-11-36	B. T. rings, trophozoites, gametocytes—scanty.	Do.	Urine: no atebrin.
29-11-36	B. T. rings, trophozoites—scanty.	Atebrin 0.1 gm. and plasmochin 0.005 gm.	No effect on temperature.
30-11-36	..	..	Urine: no atebrin.
1-12-36	B. T. rings, trophozoites—scanty.	Atebrin 0.1 gm., t.d.s.	Do.
2-12-36	Do.	Do.	Urine: atebrin in small amount.
3-12-36	Do.	Do.	Urine: atebrin in appreciable amount.
4-12-36	No parasites	Do.	Do.
5-12-36	Do.	Do.	Do.
7-12-36	Do.	..	Do.

Other laboratory findings.—Hookworm less than 100 eggs per c.cm.; urobilin present in urine; van den Bergh indirect +, direct —; Widal: typhoid (H) 25, paratyphoid A (H) + 50; Wassermann reaction moderately positive.

In this patient the usual doses of atebrin and plasmochin in the form of dragées had no effect on the parasites in the blood. No atebrin could be detected in the urine. Even after administration of atebrin alone the absorption of the drug, as judged from excretion in urine, was slight at first. The patient had light hookworm infection and was anæmic.

Case IV.—G. A. G., aged 29, was admitted with the history of malarial fever for two weeks. He suffered from an attack of enteric fever in 1923; his liver was tender, the spleen was palpable about half an inch below the costal margin and a few moist sounds were also audible at the back of the lungs. Examination of the blood showed a scanty malignant tertian infection.

Date	Malaria parasites	Treatment	Remarks
8-10-36	Scanty M. T. rings.	Atebrin 0.1 gm. and plasmochin 0.005 gm., t.d.s.	
9-10-36	No parasites	Do.	
10-10-36	Do.	Do.	
11-10-36	Do.	Do.	
12-10-36	Do.	Do.	
13-10-36	Very scanty B. T., growing trophozoites.	..	Urine: no atebrin.
14-10-36			
15-10-36			
18-10-36	B. T. rings, growing trophozoites.	Atebrin 0.1 gm., t.d.s.	Urine: appreciable amount of atebrin.
19-10-36	Do. scanty	Do.	
20-10-36	Do.	Do.	
21-10-36	No parasites	Do.	
22-10-36	Do.	Do.	

Other laboratory findings.—R. B. C. 3,490,000; hæmoglobin 70 per cent; Wassermann reaction strongly positive; van den Bergh: indirect—faintly positive, direct—negative.

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This patient did not show any gastro-intestinal trouble, yet no atebrin was detected in the urine after administration of the combined dragées for five days. But when plain atebrin was started the urine showed appreciable amounts of the drug.

Case V.—S. C. S., aged 37, was admitted with the history of an attack of malaria about two months back. Eleven days after admission into the hospital, the patient started getting fever and, on examination of his blood, a fair number of malignant tertian rings was found. He was suffering from palpitation and difficulty of breathing and gave a history of occasional attacks of hæmatemesis. His spleen was just palpable.

Date	Malaria parasites	Treatment	Remarks
3-11-36	M. T. rings	Atebrin 0.1 gm. and plasmochin 0.005 gm., t.d.s.	
4-11-36	Do.	Do.	No effect on temperature.
5-11-36	Do.	Atebrin 0.1 gm., t.d.s.	Urine: trace of atebrin.
6-11-36	Do.	Do.	
7-11-36	Very scanty M. T. rings (thick film).	Do.	
8-11-36	No parasites.		

Other laboratory findings.—Hookworm, 3,800 eggs per c.cm.; *E. nana* cysts in stools; urobilin present in urine; van den Bergh: indirect +, direct —.

This patient suffered from a moderate infection with hookworm and showed no atebrin in the urine after administration of the combined dragées for two days. Atebrin by itself was absorbed with difficulty, as only traces were found in the urine, but the parasites disappeared from the peripheral blood on the fourth day.

Case VI.—N., aged 26, gave history of fever for six days only. Blood showed benign tertian infection. He gave a history of chronic constipation.

Date	Malaria parasites	Treatment	Remarks
25-10-36	B. T. rings, growing trophozoites and schizonts.	Atebrin 0.1 gm. and plasmochin 0.005 gm., b.d.	
26-10-36	Do.	Do.	
27-10-36	Do.	Do.	No effect on temperature.
28-10-36	Do.	Quinine.	
29-10-36	Scanty B. T. rings, growing trophozoites.	Do.	
30-10-36	No parasites	Do.	
31-10-36	Do.	Do.	
1-11-36	Do.	Do.	Urine: no atebrin.
3-11-36	Do.	..	Do.
4-11-36	Do.	..	Do.

Other laboratory findings.—Bact. pseudo-carolinus and *Ps. pyocyanea* present.

In this patient the combination dragées had no effect and administration of quinine caused disappearance of the parasites and symptoms were controlled. No atebrin could be detected in the urine. The stools of the patient showed the presence of organisms of the metadysentery group. This is the class of case in which the gastric acidity is usually low and the meal rushes through the small intestine.

Case VII.—H., aged 30, was admitted with the history of malaria—off and on—for three years. He was treated outside with quinine, esanofele, etc., but without much effect. His spleen was just palpable and blood showed scanty benign tertian infection.

Date	Malaria parasites	Treatment	Remarks
	B. T. rings and growing trophozoites—scanty.	Atebrin 0.1 gm. and plasmochin 0.005 gm., t.d.s.	
	Do.	Do.	Urine: atebrin a trace.
	Do.	Do.	Urine: no atebrin.
	Do.	Do.	Urine: just a trace of atebrin.
	Do.	Do.	

Other laboratory findings.—Trichomonas hominis and *Bact. pseudo-carolinus.*

In this patient, after administration of combination dragées, only a minute trace of atebrin could be detected in the urine and the parasites and symptoms persisted. The stools showed the presence of organisms of the metadysentery group. It is the class of case in which the meal rushes through the intestine and the urine only shows a trace of atebrin when it was given either in the form of combination dragées or by itself.

Discussion

Variations in the effectiveness of drugs and relative resistance of certain strains of malarial parasites have been frequently reported. What we wish to show, by describing these cases, is that absorption and excretion of drugs are important factors and should not be lost sight of when expected results are not forthcoming. The same drug, given to two different patients under similar conditions for the same symptoms, has behaved entirely differently, and, on testing the urine, one showed the presence of the drug while the other did not.

The reason of this variability in absorption is not far to seek. An analysis of the records of patients admitted into the Carmichael Hospital for Tropical Diseases during the year 1935 shows that in as many as 60 per cent of the patients the gastro-intestinal tract was involved.

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Detailed investigation with the help of laboratory and *x*-ray examinations brought out the fact that approximately 26 per cent suffered from helminthic infections, 28 per cent from catarrhal conditions of the intestines of various origin and the remaining patients from pathological appendix, gastro-duodenal ulcer, pathological gall-bladder, etc. Helminthic parasites, especially hookworm, live in the upper part of the small intestine and a heavy infection may alter the normal physiological processes of absorption in this part (cases II and V). In addition, a large number of patients complained of vague abdominal symptoms without showing any definite laboratory findings for known infective agents. Most of these patients showed a condition of hypo- or hyper-chlorhydria which is very commonly associated with chronic dysenteries and colitis in which the original causal agent, either bacterial or protozoal, is very difficult to detect. The acidity of the stomach is in itself a factor in the absorption of the drug inasmuch as it is often here that the drug is rendered suitable for absorption by disintegration of tablets and conversion of insoluble into soluble compounds.

Another important factor which should not be lost sight of is that the rapid passage of the drug through the small intestine, where absorption of a drug usually takes place, occurs in chronic diarrhœas and dysenteries. *X*-ray examinations by barium meal show that the meal in these cases hurriedly passes through the small intestine and in a few hours, less than five usually, it reaches the pelvic colon, not a trace being left in the small intestines. The drug is thus not allowed time for absorption. Besides these conditions, the mucous membrane of the gastro-intestinal tract is not quite normal in a large percentage of patients in the tropics and peptic ulcers, pathological gall-bladder and appendix are frequently met with. The absorption of drugs in such cases may not be normal.

Summary

The following factors may be responsible for the variability in the absorption of drugs from the gastro-intestinal tract and the practitioner in the tropics should bear them in mind when the expected therapeutic results are not obtained :—

(1) The acute or chronic inflammatory condition of the mucous membrane. It is well known that under such conditions absorption of drugs is modified.

(2) The rapid passage of the meals through the small intestines generally, and upper part of the small intestine particularly, where absorption of these drugs usually takes place.

(3) The hypo-acidity of the stomach which is often met with in chronic dysenteric infections.

(*Continued at foot of next column*)

THE TREATMENT OF PITYRIASIS ROSEA

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and

N. C. DEY, L.M.P., L.T.M.

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THE ætiology of pityriasis rosea is still unknown and there are several theories as to its cause. The most recent of these is that the disease is caused by a filtrable virus, and as the work described in this paper was undertaken solely with the object of testing this theory it is the only one that will be considered.

Wile (1927), as the result of several years' observation amongst a large body of university students, has produced some facts that suggest that pityriasis rosea is contagious, and after many failures he partially succeeded in transmitting it to himself and three other volunteers. He employed fluid from a blister raised over a typical lesion, in two of the cases it was injected intradermally and in two it was applied to a scarified surface. The eruption produced was very mild and short-lived in every instance but some of the lesions definitely resembled those of pityriasis rosea.

Thomson and Cumings (1931) made a complete pathological investigation of the disease

(*Continued from previous column*)

(4) Lastly, the drug may be administered in the form of tablets which are not properly constituted. Some of the ingredients used may prevent the disintegration of the tablet before reaching the part where absorption of the drug takes place, and in some cases the tablets may not disintegrate at all and may pass through the gut in an unbroken mass. It is open to question whether the atebrin and plasmochin combination in the dragées used renders the absorption of the individual drugs more difficult. It will be observed that, in a number of cases cited, atebrin was not absorbed when the combination dragées were administered, whereas atebrin in the form of tablets by itself was absorbed.

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and they obtained suggestive positive skin reactions, working on lines similar to those used in the Dick reaction, by the employment of a filtrate of scales from the lesions. They also tried to produce the disease by intradermal injection of blister fluid after Wile's method. Altogether, twenty healthy persons and five with other skin diseases were tried in these two experiments and none of them contracted the disease. In spite of these negative results, after careful consideration of all the facts, these two workers consider that pityriasis rosea has some connection with the exanthemata and is probably caused by a filter-passing virus. They explain their failures on the ground that it is an organism to which the majority of people are refractory, and it is pointed out that Wile's partial successes were achieved by inoculation from cases of unusual severity, which suggests a strain of more than usual virulence.

After a very full discussion of all the theories, old and new, which it is not considered worth repeating here, Lord (1932) came to the conclusion that pityriasis rosea is feebly infectious, the causative organism is unknown and the portal of entry is the herald spot.

There are several skin diseases that are now generally accepted as being caused by filtrable virus and amongst these are molluscum contagiosum and infective warts. Ghosh (1934), in the case of molluscum contagiosum, and Ghosh and Maplestone (1935), in the case of warts, working at the Calcutta School reported favourable results in the treatment of these diseases by injection with filtered carbolized emulsion of material taken from the skin lesions and presumably containing the killed virus. On this account it was decided to try the same form of treatment in pityriasis rosea.

Method of preparing the lysate.—A recently-erupted spot of moderate size (1 to 1½ cm. in diameter) is selected and thoroughly cleaned with a mixture of alcohol and ether in equal parts. The spot is then anæsthetized by injection beneath it of 2 per cent novocaine solution. An incision is made with a sharp knife completely surrounding the lesion but care is taken not to involve any healthy skin in the circle. The portion outlined by the incision is dissected out, and the whole depth of the cutis vera is removed along with the epidermis, but care is taken not to include any subcutaneous fat. The wound is closed by one or two horse-hair sutures and an appropriate dressing applied.

The portion of skin is placed in a sterile test tube and weighed by difference, the weight of the empty test tube having first been ascertained. The tissue is washed in normal saline solution and this is poured away to remove as much blood as possible and it is placed in an agate mortar with sterile pumice powder and thoroughly ground up. Normal saline is gradually added during the process until an amount representing 1 c.cm. of saline to each 10 mgm. of tissue has been added. When the emulsion appears homogeneous it is filtered through a Chamberland L3 candle into a vaccine bottle and an amount of 0.2 per cent formalin* or 1 per cent carbolic in saline is added, the amount being equal to the amount of the filtrate. After being tested for sterility the filtrate so prepared is used for injection.

Dosage.—The initial dose we used was 0.1 c.cm. and this is increased by 0.1 c.cm. for every succeeding dose until a maximum of 0.5 c.cm. has been reached, in the case of adults. For children the same initial dose was given but the maximum was only 3 c.cm. It is probable that larger doses could be given for in one case (no. 14) larger doses were tried to see if they were more efficacious than the smaller ones and no unpleasant reactions were noted but, as they apparently were no better than the smaller doses, they were not repeated in other cases. Injections were given every three or four days if the patients attended regularly; it will be noted in the protocol that this interval was considerably exceeded in some instances, but only because the patients did not come on the proper days. We found no difference in results of treatment whether an auto-lysate or a stock lysate pooled from a number of patients was used.

The particulars of the cases and results of treatment are given in tabular form. Nothing of special interest emerges from these records regarding the ætiological characters of the cases studied. It will be seen that the majority of the patients are older children or young adults, which is the same age incidence as has been noted elsewhere. The males are in great preponderance over the females but this is in no way significant for the numbers of males attending the department are much greater than those of the females. The same thing is found when caste and race are considered for the apparently much greater number of Hindus than of Mohammedans is explained when it is noted that the average attendance of the former for all diseases is about four times that of the latter, and people of European descent are relatively rare in our clinic, which fact accounts for the few persons of this category in our series. From these observations it may be concluded that pityriasis rosea in India shows no epidemiological differences from those seen in other parts of the world where the disease has been studied.

Although no detailed investigation regarding other possible causes of the disease was made the opportunity was taken to examine all of our patients for the presence of fungi in the lesions, because one of the theories of the causation of

*Formalin was soon given up as it was found very painful, even in the strength of 0.1 per cent in which it was used, whereas 0.5 per cent carbolic is painless, so it is now always employed.

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the disease is that it is a fungus infection. Only one of our cases showed any fungus at all and he said he had been suffering with tinea cruris of the groins for many years. Although the fungus theory has few supporters at the present day our results, in a country where all kinds of skin disease from fungal infection flourish, lend strong support to the view that it has nothing to do with the causation of pityriasis rosea.

Pityriasis rosea is a self-limiting disease and it usually disappears spontaneously in six to eight weeks from the first appearance of the herald spot and about four weeks after it has become generalized, though there are a few instances where it persists for months. It is therefore rather difficult to assess with any degree of accuracy the value of our form of treatment. The facts that most of our cases, that had persisted for two months or longer, cleared up fairly rapidly after beginning injections and that about half the cases lasted less than four weeks from the time the herald spot appeared are suggestive that the treatment lessens the duration of the disease. An attempt was made to check our results by means of controls selected at different times during the investigation; these were given nothing but calamine liniment to apply. Unfortunately none of these controls continued to attend for more than a fortnight although there was no sign of the disease improving. It is probable that they were dissatisfied at not receiving as much attention as the others who were getting injections. Injection treatment is remarkably popular in India and one is repeatedly being asked by patients to employ it for all imaginable diseases, and refusal to do this often causes obvious disappointment and dissatisfaction.

Relapse or a second attack of pityriasis rosea is not common, but it occurred in two of our series. In one the rash returned two months after its apparent cure, and in the other six weeks afterwards. Both these second attacks were generalized from the beginning and there was no herald spot.

It is not claimed that our results are sufficiently definite to prove by specific injections that the disease is caused by a filtrable or other organism, but we do consider they lend strong support to this idea, which is gradually gaining ground amongst dermatologists.

TABLE

Showing details of cases and their treatment

No.	Age	Sex	Caste *	Site of herald spot	Time herald spot appeared before being seen	Details of treatment		Duration of treatment in days	Total duration of disease in days	Remarks
						Date 1935	Dose in c.cm.			
1	28	M.	H.	?	2½ months	11/2 13/2 15/2 18/2	0.1 0.2 0.3 0.4	8	83	Cure.
2	20	M.	M.	Abdomen	20 days	29/4 1/5 4/5 8/5 10/5	0.1 0.2 0.3 0.4 0.5	12	32	Do.
3	17	M.	A.-I.	Back	14 „	1/6 3/6 5/6 8/6	0.1 0.2 0.3 0.4	8	22	Do.
4	35	M.	H.	?	8 „	6/7 8/7 10/7 13/7	0.1 0.2 0.3 0.4	8	16	Do.
5	19	M.	H.	?	3 weeks	18/7 22/7 24/7 27/7	0.1 0.2 0.3 0.4	10	31	Do.
6	60	M.	H.	?	1 month	20/7 24/7 27/7 31/7	0.1 0.2 0.3 0.4	12	42	Improved; ceased attending.

* H. = Hindu. M. = Mohammedan. A.-I. = Anglo-Indian. I. C. = Indian Christian. All the cases had a generalized eruption when treatment was commenced.

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TABLE—*contd.*

No.	Age	Sex	Caste *	Site of herald spot	Time herald spot appeared before being seen	DETAILS OF TREATMENT		Duration of treatment in days	Total duration of disease in days	REMARKS
						Date 1935	Dose in c.cm.			
7	34	M.	H.	?	15 days	20/7 22/7 24/7 27/7	0.1 0.2 0.3 0.4	8	23	Improved: ceased attending.
8	20	F.	A.-I.	Arm	2 months	25/7 27/7 29/7 31/7 3/8	0.1 0.2 0.3 0.4 0.5	10	70	Cure.
9	12	M.	H.	„	7 days	10/8 14/8 17/8 19/8	0.1 0.2 0.3 0.5	10	17	Do.
10	18	M.	H.	?	15 „	28/8 30/8 2/9 4/9 11/9 17/9	0.2 0.4 0.5 0.5 0.5 0.6	20	35	Attended irregularly, so given larger dose. Cure.
11	22	M.	H.	Arm	20 „	5/9 7/9 9/9 11/9 14/9	0.1 0.2 0.3 0.4 0.5	20	30	Cure.
12	25	M.	H.	Abdomen	10 „	14/9 16/9 18/9 21/9 23/9	0.1 0.2 0.3 0.4 0.5	10	20	Do.
13	..	..	..	2 simultaneous on abdomen.	7 „	30/10 1/11 4/11 7/11	0.1 0.2 0.3 0.5	8	15	Do.
14	30	M.	H.	?	7 „	2/11 4/11 7/11 9/11 12/11 14/11	0.3 0.4 0.6 0.8 0.8 0.8	13	20	Do.
15	21	M.	H.	Back	15 „	2/12 4/12 7/12 9/12 11/12 1936	0.1 0.2 0.3 0.4 0.5	10	25	Do.
16	7	F.	M.	Forearm	2 months	15/4 18/4 20/4 22/4	0.1 0.2 0.3 0.3	8	68	First given salicin three grains twice daily for two months without improvement.
17	37	M.	I. C.	?	10 days	13/4 16/4 20/4 23/4	0.1 0.2 0.3 0.4	11	21	Cure.
18	19	M.	M.	Abdomen	6 „	27/4 29/4 2/5 4/5	0.1 0.2 0.3 0.4	8	18	Do.

* H = Hindu. M. = Mohammedan. A.-I. = Anglo-Indian. I. C. = Indian Christian. All the cases had a generalized eruption when treatment was commenced.

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TABLE—*concld.*

No.	Age	Sex	Caste*	Site of herald spot	Time herald spot appeared before being seen	Details of treatment		Duration of treatment in days	Total duration of disease in days	Remarks
						Date 1936	Dose in c.cm.			
19	13	F.	H.	Thigh	15 days	6/5 9/5 12/5 15/5 19/5	0.1 0.2 0.3 0.4 0.5	14	29	Cure.
20	16	M.	H.	Arm	12 „	6/5 9/5 13/5 21/5 23/7 25/7	0.1 0.2 0.3 0.4 0.2 0.4	16	28	Cure. Relapse, cured with two injections.
21	20	F.	H.	Chest	2½ months	16/5 18/5 20/5 27/5 16/6 20/6	0.2 0.3 0.4 0.5 0.5 0.5	12	87	Do.
22	23	M.	M.	Arm Chest	1 month 3 weeks	27/7 29/7 1/8 5/8	0.1 0.2 0.3 0.4	10	40	Cure.
23	9	F.	A.-I.	Abdomen	3 months	8/8 11/8 13/8 15/8 24/8	0.1 0.2 0.3 0.3 0.3	17	107	Do.
24	14	M.	H.	Chest	5 days	12/8 15/8 19/8 22/8 29/8	0.1 0.2 0.3 0.4 0.4	18	23	Do.
25	16	F.	H.	Arm	1 month	2/9 5/9 9/9	0.2 0.2 0.2	8	38	Do.
26	21	M.	H.	Back of wrist.	10 days	16/9 19/9 23/9	0.2 0.3 0.4	8	18	Do.
27	12	F.	H.	Arm	1 month	30/9 7/10 10/10 12/10	0.1 0.2 0.3 0.3	13	43	Do.
28	30	M.	H.	?	12 days	7/10 10/10 12/10	0.1 0.2 0.3	6	18	Do.

*H = Hindu. M. = Mohammedan. A.-I. = Anglo-Indian. I. C. = Indian Christian. All the cases had a generalized eruption when treatment was commenced.

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HODGKIN'S DISEASE OF THE PEL-EBSTEIN TYPE: SOME UNUSUAL FINDINGS

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HODGKIN'S DISEASE is not very frequently encountered in this country, though the incidence is probably about the same as it is in England. The following case is reported in some detail as it exhibited unusual features :—

An Anglo-Indian boy, aged 12 years, was admitted to the Carmichael Hospital for Tropical Diseases on the 25th June, 1936, with a history of periodical bouts of fever since September 1935, that is, for nine months.

In October 1935, he was admitted to the Presidency General Hospital and diagnosed clinically as a case of kala-azar. He was given a course of antimony injections; the temperature came down and he was discharged as cured.

Next month he had another attack of fever and was readmitted to the same hospital, but by the time he arrived in the hospital the temperature had already come down. As he was anæmic he was given a course of campolon and discharged about the end of December. The boy kept fairly well during January 1936, but during the next four months he had three bouts of fever and was treated in the railway hospital. As the febrile relapses could not be stopped, he was sent to this hospital.

On admission, the patient was afebrile. He was anæmic, and his complexion was pale and yellow; this was assumed to be due to atebrin he had taken outside. The spleen was enlarged 1½ inches and liver ¾ inch below the costal margin. There was a functional systolic bruit in the heart. A few glands were palpable in the neck and groins; these were small, discrete and painless. No abnormality was detected in any other system.

After eight days' stay in the hospital he developed fever which gradually increased; the temperature varying from 102°F. to 104°F. The spleen was enlarged 3 inches below the costal margin, and was soft but not tender. The pulse was rapid (140 per minute). He had slight bronchitis. There was no toxæmia. He was given expectant treatment, *viz*, quinine, diaphoretics, digitalis, glucose, etc. The temperature came down by lysis after 18 days.

The boy remained afebrile for the next ten days except for a slight rise in temperature towards the latter part of this period. The spleen rapidly diminished till it was just palpable. In view of the past history and the finding of some suspicious bodies in the spleen puncture smear neostibosan injections were started on the 22nd July; a course of 12 injections (daily) amounting to a total of 2.3 grammes was given.

On the 30th July the patient had another bout of fever, the second since his admission. It was of the same type as the first one and was associated with splenic enlargement and tachycardia; the temperature came down on the thirteenth day. Towards the end of this period he had local inflammation in the throat. The glands in the neck were considerably swollen and tender. In view of the possibility of a generalized streptococcal infection he was given a salicylate mixture and prontosil, together with local treatment for the throat.

This was followed by another period of apyrexia for 13 days with diminution of the spleen; the glands in the neck also subsided considerably.

On the 24th August began the third attack of pyrexia and splenic enlargement. This time definite enlargement of the glands of the neck, especially of the left side, with a few in the axillæ and groins was noticed. Considering the possibility of the condition being Hodgkin's disease of the Pel-Ebstein type, we gave him liquor arsenicalis (2 minims gradually increased to 6 minims) twice a day. As the general condition was low and deep *x*-ray therapy is not so satisfactory in this type of the disease, this treatment was not given. This attack of fever lasted for 15 days.

He was again afebrile for eight days. The size of the spleen and the glands diminished considerably. Next he had low intermittent fever for 12 days. About this time the boy appeared to show some signs of arsenical intolerance; he was disinclined for food, vomited after his breakfast for three days, and complained of pain in the right leg along the sciatic nerve. Arsenic was stopped and some sodium thiosulphate was given intravenously.

On the 28th September the fourth attack of fever in this hospital started. The spleen, as usual, increased and the glands again enlarged. There was definite evidence of neuritis in the right leg, the pain being intense at times; it was most marked in the sole of the foot and behind the leg. The calf was very tender. The knee-jerk was sluggish. There was no anæsthesia. The present attack lasted for a fortnight when the temperature suddenly dropped to normal. Treatment given during this period was mostly symptomatic and consisted of iodides, analgesics and digitalis. The leg was wrapped in cotton-wool and the foot supported between sandbags.

During the next ten days he had a low irregular temperature. The spleen was again reduced and the glands subsided. The general condition was poor. He became very anæmic. On 16th October he was put on a course of campolon injections—4 c.cm. intramuscularly for five consecutive days. On 21st October he was put on ferrous sulphate, 12 grains daily for 21 days. There was some improvement in the anæmia, but with the next bout of fever coming on the anæmia again became severe.

The temperature gradually went up higher daily; this rise constituted the fifth relapse while in this hospital. His condition was now serious and there was high continuous temperature for several days. The stools and urine were passed in the linen and the abdomen was distended and slightly tender. The spleen was enlarged but the glandular enlargement was not very marked this time. During this period treatment consisted of iron, as stated above, stimulants and nursing. The temperature came down about the twentieth day of this bout and it was normal throughout one day but rose again and assumed an intermittent and then a remittent type. The spleen was reduced to 1½ inches and the glands were just palpable.

On 17th and 20th he was given mercurochrome intravenously, 1 c.cm. and 2 c.cm. of a 1 per cent solution.

Physical examination on the 22nd November.—Very low condition: he had a pale yellow complexion and was very anæmic. He had some shivering. The cervical glands were palpable, small, discrete and not painful. Heart slightly enlarged; a systolic bruit was present. Pulse—140 per minute, soft. Respiration—30. Lungs—a few rhonchi behind.

The abdomen was slightly distended, doughy to the feel, with no fluid, but slightly tender.

Spleen—1½ inches; liver—½ inch; his face was puffy and eyelids swollen. Both legs and hands were œdematous. He complained of pain in the right leg, especially of the sole, this was less severe than before. Sensation was markedly diminished, almost lost, in the right foot. Motor power of the right leg was practically lost. Knee-jerks were absent. Plantar reflex was normal in the left and lost in the right foot. Sphincter control was impaired. A few small glands were palpable in the groin. He was quite conscious.

After this the boy went steadily down hill; he lost control of his sphincters, but passed very little urine;

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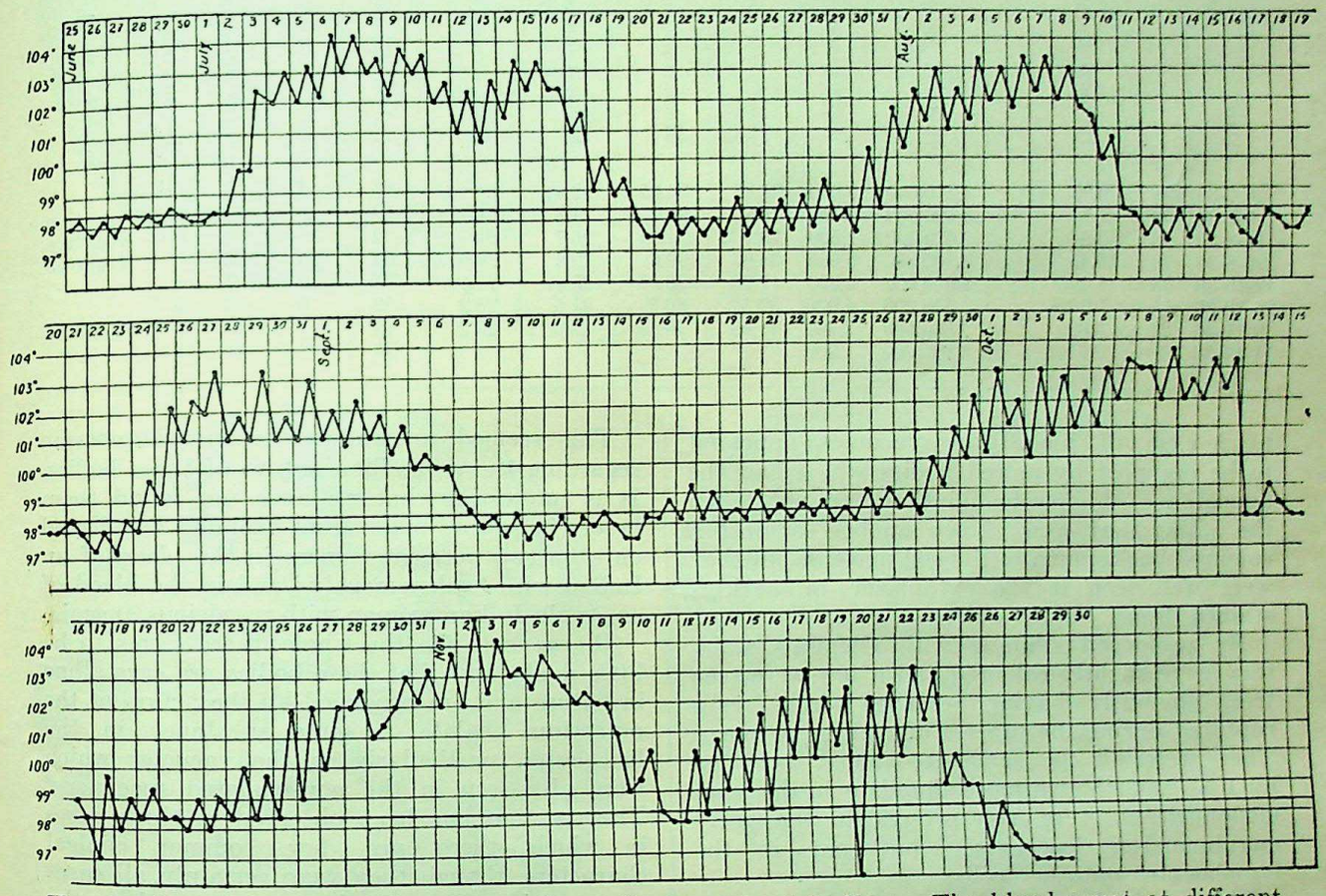
his whole body became puffy. On the 25th evening, the temperature fell; he became very collapsed and scarcely recovered consciousness until his death on the 29th.

A distressing symptom that appeared during the last few weeks of the illness was severe pains all over the body, so the patient dreaded being moved or even touched. This made us disinclined to submit him to any treatment that was not aimed at relieving symptoms.

and its replacement by a vascular tissue consisting of lymphoid cells, fair number of both mononuclear and multinucleate giant cells (so-called Dorothy Reed cells), and fibroblasts (plate III, figures 2 and 3). There are also many swollen reticular cells. Many areas of necrosis and hæmorrhage may be found scattered irregularly (plate III, figure 4). Eosinophilic cells which are sometimes found in large number in these glands are not seen here.'

CHART

Temperature chart showing the characteristic Pel-Ebstein type of fever



The question of deep *x*-ray therapy was frequently considered but not given for this reason, and in view of the poor results that follow in this type of case.

Further blood examination was made difficult by the general anasarca, and, though we were anxious to confirm the diagnosis by removing a gland and sectioning it, we hesitated to subject the boy to this amount of disturbance.

Other than the cytological examinations of the blood, which we report in detail below, numerous laboratory investigations were carried out during the boy's stay in hospital; these included the Wassermann test, protozoal and bacterial blood cultures, agglutination test on three occasions against the typhoid group, melitensis and abortus, and numerous stool examinations; all gave negative results. An *x*-ray examination of the chest showed increased hilar shadows; the Mantoux test was negative at 1 in 10,000, but higher doses were not tested; a sputum inoculation into a guinea-pig gave a negative result.

A full post-mortem examination was not allowed but a gland was removed at the time of his death and was sectioned.

The report of Professor M. N. De on this gland was as follows:—

'The lymph node is somewhat enlarged and fairly firm. The cut surface appears greyish-white and congested. Histological examination reveals a complete disappearance of the normal structure (plate III, figure 1)

Blood findings.—The blood count at different periods is shown in the table. At first there was nothing very characteristic about the blood counts. There was marked and increasing anæmia (intermediate hæmoglobin estimations are not recorded in the table) of a more-or-less normocytic type. During the fourth febrile bout a most marked large mononuclear increase was observed. Differential counts were done almost daily between 26th October and 9th November; the large mononuclear count varied from 25 per cent on 27th October, when the temperature curve was rising, to 57 per cent on 3rd and 5th November when it was at its peak.

The large mononuclears were unusual in appearance. Treated by supravital staining methods, most of these cells seemed to be of the histiocyte type. Stained by Leishman's, Giemsa's or Wright's methods they appeared large and vacuolated, the vacuoles often overlapping the nucleus and giving it a moth-eaten appearance. In those blood smears made from oxalated blood (potassium oxalate 0.01 gramme

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TABLE

Blood counts

Date	Hæmoglobin per cent	Red blood cells per c.mm.	White blood cells per c.mm.	Cell volume per cent	Mean corpuscular volume, cu. μ	Mean corpuscular hæmoglobin, $\gamma\gamma$	Mean corpuscular hæmoglobin concentration per cent	Differential leucocyte count: Polymorphonuclears	Lymphocytes	Large mononuclears	Eosinophils	van den Bergh indirect
26-6-36	68 = 9.35 gm.	4,170,000	5,650	34.88	83.65	22.41	26.86	65	32	1	2	..
9-7-36	56 = 7.7 ,,	3,190,000	2,100	28.8	92.9	24.8	26.7	58	38	4	0	Negative.
10-8-36	48 = 6.6 ,,	2,470,000	2,500	20.165	81.64	26.7	32.7	42	54	4	0	Negative.
26-8-36	76 = 10.45 ,,	3,500,000	5,500	34.97	99.6	29.8	29.9	64	33	3	0	Negative.
12-10-36	38 = 5.225 ,,	2,080,000	2,200	17.98	86.44	25.12	29.19	45	10	44	1	..
26-10-36	55 = 7.5625 ,,	3,550,000	4,900	30.52	80.2	21.6	25.2	59	6	35	0	..
9-11-36	22 = 3.025 ,,	1,680,000	2,750	11.99	70.13	18.0	25.2	49	7	42	2	Positive.
11-11-36	19 = 2.6125 ,,	1,670,000	1,900	..	..	..	..	56	2	41	1	..

to 5 c.cm. of blood) the vacuoles appeared to be occupied by paired bodies which had the appearance of diplo-bacilli that had not taken the stain; they were shown up best against a coloured background of the cell nucleus, but they were well seen in the cytoplasm in darkly-stained films.

By prolonged staining with Giemsa's stain, they were slightly coloured and a few were seen free, obviously having escaped from cells ruptured during the process of making a smear. They were all the same size—about 2 to 3 μ by 1 μ—and, though most abundant in the large mononuclears, were also present in the polymorphonuclear leucocytes, but not in the lymphocytes or other cells.

These paired bodies interested the writers considerably at the time they were first noticed as this was the first case in which they had been seen. The first impression created was that they were some form of crystalline body, but later we considered the possibility that they were intracellular micro-organisms. With this possibility in view, with the assistance of the bacteriological department of the school, we attempted to grow the hypothetical organism from the blood by a number of methods, including culture on liquid and solid medium, of various compositions, in the presence of oxygen, in the presence of CO_2, and anaerobically, but with consistently negative results. Later, we noticed that the paired bodies were only found in the oxalated specimens of blood and not in the direct smears made at the same time, though the vacuolation in the large mononuclears was still very marked. The bodies were not present in every oxalated specimen and varied in number from day to day (plate III, figures 5, 6 and 7).

This seemed to confirm the first impression regarding the crystalline nature of these bodies. It is interesting that we have not found them before in smears made from oxalated blood, and only on two occasions since; in the blood of an Indian with 'splenomegaly' and in the blood of an Anglo-Indian woman with pernicious anæmia.

Discussion.—On the whole, there seems to be little doubt now that these bodies are crystalline in nature and are produced by the action of the potassium oxalate on some substance in the leucocytes, particularly in the vacuoles which were also seen in the non-oxalated specimens. The reaction has been observed in three cases in which there are few common clinical characters, though they were certainly all cases of anæmia. This further suggests that the change in the chemistry of the white cells, whatever it is, is not specific. The possibility of the bodies being living organisms is not entirely negatived, as one could hypothesize an organism being acted upon and made visible by treatment with potassium oxalate.

It is probable that other workers have observed these bodies in the leucocytes in oxalated blood, but so far we have not seen any reference to such a finding in the literature.

Further investigations to determine the nature of these bodies are under consideration.

Diagnosis.—The clinical diagnosis of Hodgkin's disease was made mainly by a process of elimination, but its accuracy was frequently doubted by ourselves and questioned by others.

The temperature chart had the appearance of the classical Pel-Ebstein type of the disease, but the glandular enlargement was not marked

(*Continued at foot of opposite page*)

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PLATE III

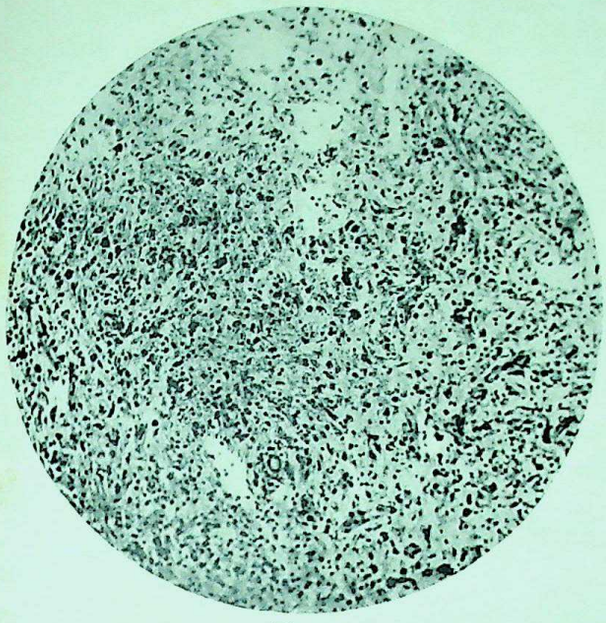


Fig. 1.

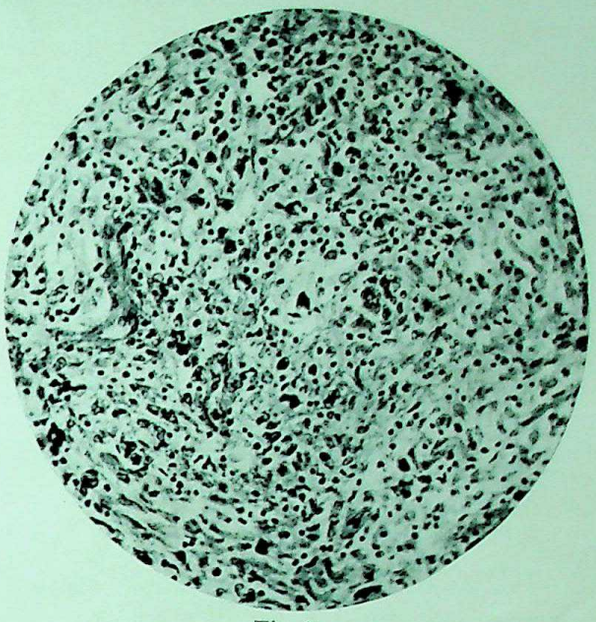


Fig. 2.

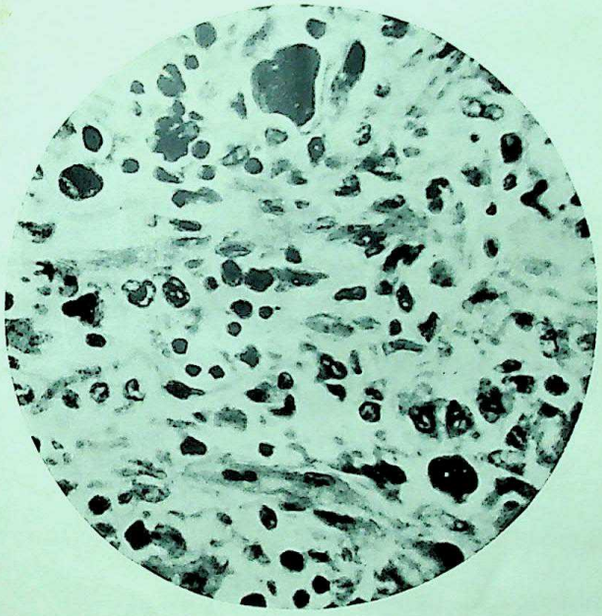


Fig. 3.

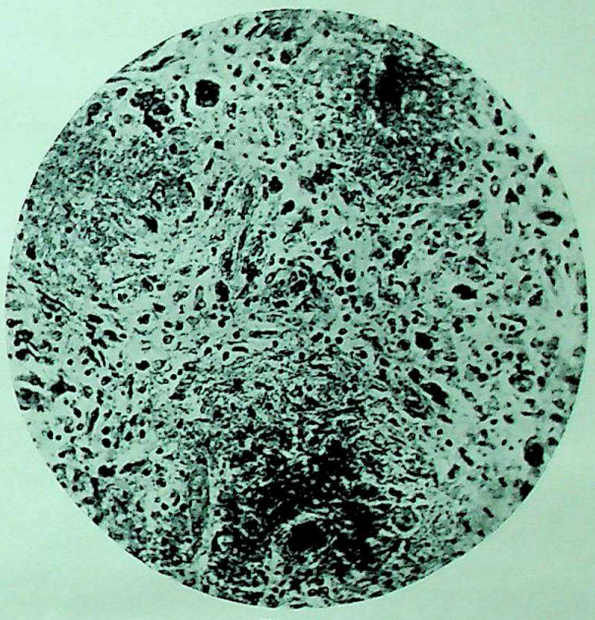


Fig. 4.

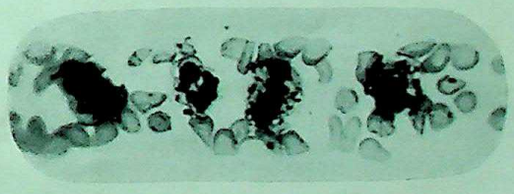


Fig. 6.



Fig. 5.

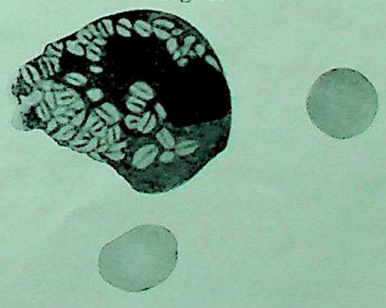


Fig. 7.

Figures 1, 2, 3 and 4 show sections of a lymphatic gland; figures 5 and 6 show the paired bodies in the leucocytes in the 'tail' of a blood smear; and figure 7 is a drawing of a large mononuclear cell containing a large intracellular paired bodies.

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A RECORD OF RHINOSPORIDIAL POLYPI WITH SOME OBSERVATIONS ON THE MODE OF INFECTION

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AFTER the recent publication of 60 cases of rhinosporidiosis by Allen and Dave (1936), this review of my 48 cases collected during the past five years would be of little interest, had it not been for the fact that (1) my cases have been collected from areas of infection which fall in four distinct groups and (2) that a common causal factor of infection is in evidence in all of them.

Ashworth (1923) has concluded that the mode of infection remained undetermined. Allen and Dave (1936) have not been able to discover a common causal source of infection in their 60 cases.

I have tried here to establish, by review and illustrations of case records, that the infection as seen in Poona is 'water-borne'. The cases reviewed are from two districts, Poona and Satara. Two areas of infection have been investigated and the source of infection in the other two is made evident from the review of case records detailed herein.

The first out of the series of my cases in which the rhinosporidium was identified was a polypus removed on 6th February, 1931, from case 1, G. T., a sand-worker.

Group I, Poona.—Source of infection: portion of the river Mula-Mutha between the Holkar bridge and the Jamsetji Bund.

(*Continued from previous page*)

and was evanescent; on some days even the glands in the neck were scarcely noticeably enlarged.

Another clinical feature was the behaviour of the spleen. In the interval between febrile attacks it was usually just palpable; it began to enlarge just before the temperature rose and continued to do so with the utmost precision by half to three-quarters of an inch a day; with the fall of the temperature it again subsided.

The blood picture gave no assistance: the very marked large mononuclear increase is not a common feature of this disease, nor is the low eosinophil count. The diagnosis was, however, confirmed by the histological section of the gland removed at the time of death; in this the picture was typical of the condition.

Our thanks are due to Captain C. L. Pasricha for his advice and the assistance of his department in the bacteriological examinations, and to Professor M. N. De for his report in the sections of the gland and for the four excellent photomicrographs of these sections, over which he took considerable trouble personally.

An occupational disease

During the succeeding two years, *i.e.*, up to February 1933, eight more rhinosporidial tumours were collected. All the men were 'sand-workers' engaged in collecting sand from the river bed. A common causal factor was at once evident. On 26th August, 1932, case 8, A. K., a carpenter, was seen with a rhinosporidial tumour. He was discovered to have been a sand-worker previously. At this time the mode of infection was not unnaturally thought to be in the peculiar type of work in which these men were engaged, that is, that of collecting sand from the river bed. The disease appeared to be an occupational one.

The portion of the river Mula-Mutha used for the collection of sand lies to the north of the city, between Jamsetji Bund two miles from the Sungum, and the village of Dapodi about the same distance from Kirkee. The men work in groups of 4 to 20 in one area, known as a 'plot', for 2 to 8 hours a day, eight months in the year. About 200 men are engaged in the occupation, but not more than a hundred are engaged in one season, the bigger groups being situated between the Bund and the Holkar bridge, a mile and a half from the Sungum up the river.

In order to ascertain the extent of infection amongst the sand-workers commencing on 10th March, 1933, 55 men were examined.

	All cases	Infected
Number examined ..	55	10
Ages, years ..	20 to 40	..
Period engaged, years ..	1 to 14	2 to 7 (except 1)
Hours of work ..	2 to 6	..
Nature of work—		
Carters	10	..
Divers	45	10
Habits—		
Smokers	23	2
Non-smokers ..	16	7
Not noted	16	1

In 14 cases other nasal diseases were present and 10 had chronic catarrh; none of the latter group had rhinosporidial infection.

The men were mostly Bhois or Mahrattas, but there were four Kolis (fishermen) who, though engaged in the work all their lives, were not infected.

None of the members of the families of the workers was infected.

Infection rate in the sand-workers is about 1 : 5.

By the end of the year 1933, 16 tumours had been collected. Case 15, D. I., a farmer, was noticed to have been infected on the work during the first season's diving. Tumours from case 10, C. N. M., a mason, and case 16, S. I., a *mali*, at Yeravada could not however be traced to this occupation, although there was a probability of the infection coming from the same

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source, owing to the use these men made of the area for the purpose of bathing and swimming.

Case 10.—C. N. M., aged 40, a mason, had a rhinosporidial tumour growing from the left olfactory sulcus which was removed on 10th March, 1933. He had never been a sand-worker, but he bathed and often swam in the river between the Bund and the Sungum. The tumour recurred and was removed again on 18th May, 1934.

Case 16.—S. I., aged 30, a mali, rhinosporidial tumour growing from the floor and the left inferior turbinate removed on 6th December, 1933. He was a resident of Belapur and worked as a gardener in a bungalow on the Bund garden road. He was never in the sand-working business, but swam behind his master's bungalow.

Group II, Manchar.—Source of infection: tank to the west of the town.

A polypus removed on 8th January, 1934, from case 17, C. B., aged 25, a merchant, from Manchar was the first indication of the existence of the disease in the neighbourhood of Poona.

He also offered the useful information that some more residents of Manchar were similarly affected, and that all of them, including himself, frequently used an old tank in the town for swimming and bathing.

Manchar is situated on the right bank of the Ghodnadi river, about 12 miles north of Khed and 37 miles north of Poona. It is a market town with a population of about 4,000. To the west of the town, beyond a watercourse, is a reservoir about 25 yards square with two flights of steps leading to the water. The west wall has a niche (3 × 2 × 6 feet) with carved side posts and sculptured foliage. Within the niche is a much-worn Devnagari inscription difficult to read. A separate well nearby is reserved for obtaining drinking water.

A brook running north to south, which is nearby, is also used for swimming, when full, in the rainy season.

On 26th January, 1934, at this source of infection I collected three specimens and examined 32 bathers in the tank. The tumours removed were from cases 19, 20 and 21. In all, five cases of rhinosporidial infection were observed, one being an eye infection.

All persons examined were students. The duration of infection was between 1 to 2 years.

Infection amongst the bathers was 1 : 8. All were males.

My thanks are due to Dr. M. G. Bhave, medical officer in charge of the charitable dispensary at Manchar, for permitting me to operate at the dispensary and for the help in conducting the investigation.

Case 28.—H. K., aged 23, a merchant, had the rhinosporidial tumour removed on 25th January, 1935. Tumour growing from the floor of the left nostril. Duration of symptoms, one year. Nine months before he had stayed at Manchar for four months. During his stay there he used frequently to swim in the tank.

Case 38.—S. G. K., aged 26, a hawker in bangles. Operation on 7th August, 1935, for a rhinosporidial tumour on the floor of the right nostril. He had stayed at Manchar two years ago for three months and used to swim in the tank then. Symptoms of epistaxis for the past six months only. A very vascular tumour had been removed previously elsewhere.

A water-borne disease

It had now become evident that the disease as it appeared in Poona was no longer limited to the sand-workers. Could there not be some factor common to both Poona and the Manchar cases? The sand and the fish as a source of infection, not found in the tank at Manchar, were ruled out. The silt and the mud perhaps, but the water, the stagnant water, certainly was essentially the same in these two places.

The water in the tank at Manchar was stagnant throughout the year, excepting an occasional overflow in the rainy season. The water in the Mutha river beyond the Sungum was dammed across by the Jamsetji Bund about 2 miles down the river. In spite of the sluices in the Bund, silt and sand accumulated in the bed of the river. There was water stagnation to a great extent.

Some cases illustrating the water-borne nature of the infection in the Poona group, in persons other than the sand-workers :—

Case 33.—D. N., aged 20, a peon, tumour removed from the right side of the septum on 15th May, 1935; used to swim in the river behind the Maharaja of Kolhapur's bungalow.

Case 39.—G. B., aged 17, a potter, bathes in the river above the Sungum and collects mud and earth from the river bed for making bricks. Rhinosporidial tumour removed on 25th September, 1935, from the left side of the septum.

Case 40.—B. J., aged 25, a Bhoi, fisherman. Tumour removed from the spur on the right side of the septum on 1st November, 1935. Once removed three years ago. Bathes and swims near Sungum.

Group III, Satara.—Source of infection: three tanks in the city, Mangalwar, Machi and the municipal tank.

The suspicion aroused regarding the water-borne nature of the infection was brought a step nearer conviction by the appearance of this group of cases. The first to come under notice was case 22, S. R. K., a student, seen on 20th April, 1934, with a rhinosporidial polypus arising from the floor of the left nostril. Case 24, S. D. G., a teacher from Yawatmal in the Central Provinces, followed on 11th May, 1934. The infection was traced to the source at Satara, which place he often visited during holidays. Case 26, B. J., a clerk, had his polypus removed on 17th October, 1934. Suffered from attacks of epistaxis for three years. He gave a history of exposure to infection at Satara seven years previous to the appearance of the symptoms. Case 22 brought his brother, case 27, D. R. K., also infected at Satara, for operation on 23rd November, 1934, thus completing my first five cases from this group. They were all used to bathing and swimming in one or more of the three infected tanks in that city.

Case 25.—N. N., aged 19, rhinosporidial polypus growing from the junction of the septum and olfactory sulcus left side. Operation on 15th June, 1934. Till last year bathed in Phutka tank, now bathes in the municipal tank, Satara.

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Case 26.—B. J., aged 25, a clerk. Growth in the right nostril growing from the olfactory sulcus. Presence of the growth noticed for one month. Exposed to infection one year ago. Previously once operated on for epistaxis, three years previously a vascular growth had been removed. He had been exposed to infection seven years before. Now resident of Poona.

Satara is 69 miles by road to the south of Poona, situated on a slope below a range of hills which form a semicircular girdle round a recess, with the fort on the south and the Yawateshwar hills on the west. All drainage goes to the Yenna on the north by means of brooks rising from the hills on three sides. The city has several wells and tanks. Many of the tanks have now dried up. The three tanks to which the infection is traceable are constantly in use for the purpose of bathing and swimming, particularly in the hot weather.

The largest and the oldest is the Mangalwar or Shripat tank to the west of the city. The Phutka *talao* is in Machi *peth* near the foot of the hills and the municipal tank in Bhavani *peth*, though smaller, is very popular. The students in particular use this, because it is near the school and more central. The extent of infection in the swimming population was not investigated, but from the survey of cases the source of infection can be quite definitely traced to these tanks.

Group IV, Oundh and Yelliv.—Source of infection : old wells in the respective places.

In order to complete the record, three cases are included in this group provisionally, case 13 seen on 30th June, 1933, from Khamgaon in Bhimthadi subdivision. The village has not been traced and is included in this group for convenience.

Case 44.—K. A. G., aged 16, a student, rhinosporidial growth removed on 18th March, 1936, from right inferior turbinate. History of swimming in old well in the village of Yelliv and a tank at Oundh. He knows of some more persons with such growths using the well and the tank.

Case 45.—B. S., aged 22, a goldsmith, rhinosporidial growth in nose removed on 12th June, 1936. He visits Oundh every two or three months, and swims in the tank whenever he visits Oundh. He also visits Satara and used the Mangalwar tank a year ago once. He is a resident of Poona but never bathes in the Sungum area.

Summary of the case records

Forty-eight cases examined and treated from 6th February, 1931, to 25th October, 1936.

TABLE

Number of the group	I	II	III	IV	TOTAL
Name of the group	Poona	Manchar	Satara	Oundh and Yelliv.	..
Place of infection	River Mula-Mutha, near Sungum.	Tank west of the city.	Three tanks	Old wells	..
Number in each group	25	8	12	3	48
Site of infection—					
Olfactory sulcus	5	..	2	..	7
Septum	4	4	3	..	11
Floor of nose	1	3	2	1	7
Turbinal bones	3	..	5	1	9
Not mentioned	12	1	..	1	14
Pathological diagnosis	20	8	11	3	42
Clinical diagnosis	5	..	1	..	6
Occupation—					
Sand-workers	18	..	..	..	18
Students	..	5	6	1	12
Others	6	3	5	2	16
Not known	1	..	1	..	2

REMARKS.—The duration of the disease was up to seven years. The symptoms appeared from within a year to several years after exposure to infection. All persons infected were males.

Outstanding signs, symptoms and treatment

Epistaxis, the presence of a strawberry red growth, and nasal obstruction are the three outstanding symptoms. When the tumour is deep in the nose, epistaxis is the first symptom. Obstruction is usually the last. The sand-workers complain of inability to remain under water long enough, even with very small growths. Unlike ordinary nasal polypi these growths never cause a 'frog-nose'. Sessile growths have often a linear attachment of a mucous fold from which they grow into the cavity of the nose. Treatment is surgical. The knife is used after localizing the attachment. Allen has tried neostibosan with variable results. A rapid diagnosis is arrived at by dropping the polypus in Zenker's fluid; hundreds of tiny leaflets stand out from the surface of the polypus in a few minutes, the red colour changing to ash-grey.

Conclusions

In the cases so far recorded from elsewhere no common cause of infection has been noted. From the review of cases recorded here it is clear :—

(*i*) that the rhinosporidial infection in Poona and the neighbourhood is localized to areas divisible into groups,

(*ii*) that the infection in these groups is localized to infected water of the wells, tanks, or an infected section in the course of a river,

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APPENDIX I

List of rhinosporidial polypi removed from 6th February, 1931, to 25th September, 1936

Serial number	Identification, religion and age	Date of operation	Pathological report	Situation	Group	Occupation	Duration, years	REMARKS
				1931				
1	G. T. (H.), ..	6th Feb.	Positive	..	I	S. W.	..	..
2	N. K. (H.), 35	25th Nov.	,,	..	I	Farmer	..	Former S. W.
				1932				
3	S. I. (M.), ..	10th June	Clinical	..	I	S. W.	..	..
4	M. Y. (H.), ..	17th ,,	Positive	..	I	,,	..	..
5	B. K. (H.), ..	15th July	,,	Both nostrils	I	,,	..	Rec. 22-8-32.
6	S. V. (H.), 20	5th Aug.	,,	,,	I	,,	..	..
7	N. Y. (H.), 30	19th ,,	Clinical	..	I	,,	..	..
8	A. K. (M.), 40	26th ,,	Positive	Right nostril	I	Carpenter	..	Once a S. W.
				1933				
9	H. Y. (H.), 25	8th Feb.	Positive	Lt. septum, rt. floor.	I	S. W.	..	..
10	C. N. M. (M.), 40	10th Mar.	,,	Lt. olf. sulcus	I	Mason	2	..
11	M. A. (H.), 27	24th ,,	,,	Rt. nostril	I	S. W.	..	Rec. 18-5-34.
12	B. K. (H.), 16	16th June	,,	Both nostrils	I	,,	..	..
13	K. R. (H.), 32	30th ,,	,,	Rt. floor	IV	Farmer	2	..
14	D. H. (H.), 25	12th July	,,	Both nostrils, olf. sulcus.	I	S. W.	1	..
15	D. I. (H.), 20	30th Nov.	,,	Lt. olf. sulcus	I	Farmer	9/12	Once S. W., now Dahiwadi.
16	S. I. (H.), 30	6th Dec.	,,	Lt. inf. turb. and floor.	I	Mali	5/12	..
				1934				
17	C. B. (M.), 25	8th Jan.	Positive	..	II	Merchant	..	..
18	N. K. (H.), 30	10th ,,	Clinical	Olf. sulc.	I	S. W.	..	..
19	B. M. (M.), 14	26th ,,	Positive	Rt. floor	II	Student	1	Epistaxis.
20	B. M. A. (M.), 12	26th ,,	,,	Junct. rt. sept. and floor.	II	,,	..	Growing backwards.
21	B. K. (H.), 17	26th ,,	,,	Junct. lt. sept. and floor.	II	,,	2	Epistaxis.
22	S. R. K. (H.), 21	20th April	,,	Lt. floor	III	,,	..	Brother of no. 27.
23	B. P. (H.), 25	27th ,,	,,	..	I	S. W.	..	..
24	S. D. G. (H.), 38	11th May	,,	Rt. inf. turb.	III	Teacher	3	..
25	N. N. (H.), 19	15th June	,,	Junct. sept. and olf. sulc.	III	Student	2/12	Both tanks.
26	B. J. (H.), 25	17th Oct.	,,	Rt. olf. sulc.	III	Clerk	1/12	Epistaxis, expose. 10 yrs.
27	D. R. K. (H.), 18	23rd Nov.	,,	Lt. floor	III	Student	..	..
				1935				
28	H. K. (H.), 23	25th Jan.	Positive	Lt. floor	II	Merchant	..	..
29	P. D. M. (H.), 25	22nd Feb.	,,	Lt. med. turb.	III	Student	2	Epistaxis, 1½ yrs.
30	B. K. J. (H.), 26	1st Mar.	,,	Rt. olf. sulc.	III	,,	..	..
31	V. R. (H.), 18	10th April	,,	Lt. sept. ant. end	II	,,	1/12	..
32	H. M. H. (H.), 15	1st May	,,	Rt. septum	II	,,	..	Once pulled in childhood.
33	D. N. (H.), 20	15th ,,	,,	,,	I	Peon	1	..
34	N. K. R. (H.), 40	19th June	,,	Lt. nostril	I	S. W.	7	..
35	A. R. G. (H.), 24	21st ,,	,,	Lt. inf. turb.	III	..	..	..
36	A. G. (H.), 16	19th July	,,	Lt. olf. sulc.	I	S. W.	..	Removed 3 yrs. ago, rec.
37	S. G. D. (H.), 44	26th ,,	,,	Spur on sept. lt.	III	Pr. service	3	Epistaxis.
38	S. G. K. (H.), 26	7th Aug.	,,	Floor	II	Hawker	..	Choking, epistaxis.
39	G. B. (H.), 17	25th Sept	,,	Septum lt.	I	Potter	7/12	..
40	B. J. (H.), 25	1st Nov.	,,	Spur sept. rt.	I	Fisherman	4	..
				1936				
41	B. R. (H.), 25	24th Jan.	Positive	Ant. end lt. inf. turb.	III	Merchant	..	Six times removed.
42	K. V. R. (H.), 25	31st ,,	,,	Ethm. region under mid turb.	III	Med. student.	..	Spider-like.
43	D. N. (H.), 20	6th Mar.	,,	Rt. sept. eroding	I	Pr. service	3	Rec. swims.
44	K. A. G. (H.), 16	18th ,,	,,	Rt. inf. turb.	IV	Student	5/12	..
45	B. S. (H.), 22	12th June	,,	..	IV	Goldsmith	..	..
46	I. S. (M.), 18	4th July	Clinical	..	I	S. W.	..	..
47	B. J. K. (H.), 20	22nd ,,	,,	..	I	..	..	..
48	S. V. (H.), 22	25th Oct.	,,	Rt. septum.	III	Pr. service	4	..

S. W. = Sand-worker. Rec. = Recurrence.

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(iii) that the infection is transmitted in the process of bathing, swimming or diving, and

(iv) that the part played by the fish or other aquatic hosts, if any, is not certain, but the sand and the silt probably help the process of transmission.

Ashworth (1923) refers to direct transmission of discharged spores as an obvious method by which the infection could be spread from man to man. It is here suggested that the spread takes place through the medium of water, possibly stagnant water.

Spores in the trophic stage with a stout chitinoid envelope have been known to exist in the epidermal layer, probably having thrust their way through from the subjacent connective tissue. It is possible to imagine that such spores floating in the infected water similarly find their way into the epidermal layer from without.

The fact that the carters engaged on the sand work are not infected suggests that mere bathing in infected water is not enough. Swimming, which ensures frequent and more prolonged contact with the spores, and diving, which presses the spores against the nasal mucosa by virtue of the force of the dive and the increased water pressure, are necessary for a successful graft or anchoring of the spores. It may even be possible that this force drives the spores through the mucosa from without in the same way as the increased lymph pressure in the connective tissue has been suggested to thrust them from within. The spores are non-motile, and some such external force would seem necessary.

Whether the spores in infected water remain in the trophic stage or whether a flagellate stage exists is not known, nor is it yet certain whether the sporangium is parasitic in any of the aquatic species.

The occurrence of infection in persons exposed to infection varies within a wide range. A few contract the infection within the first year, but the majority appear to resist infection over a period of some years.

Catarrhal and suppurative conditions of the nasal cavity would seem (from group I) to resist infection, possibly on account of the phagocytic action of the inflammatory cells present in the tissues under the mucosa, in such affections of the nose.

R. E. Wright in 1922 suggested the possibility of the transmission of the organism through water, but his cases did not reveal any such common cause. In the cases recorded and grouped as above, a common cause for such a mode of transmission is made evident for the first time.

All the examples of rhinosporidium from man studied so far appear to be referable to one species, the systematic position of which, according to Prof. Ashworth, is referable to the

(Continued at foot of next column)

THE BISULPHITE-BINDING POWER OF THE BLOOD IN CASES OF EPIDEMIC DROPSY, ANÆMIA AND MALARIA AND ITS POSSIBLE BEARING ON A VITAMIN-B DEFICIENCY

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PETERS and SINCLAIR (1933) have shown that in pigeons suffering from vitamin-B_1 deficiency the brain, when incubated with lactic acid, produced pyruvic acid in appreciable amount whereas when the brain of normal control birds is substituted this is not produced. Peters and Thompson (1934) further showed that pyruvic acid is probably a normal intermediary in the course of carbohydrate metabolism. In vitamin-B_1 deficiency the metabolism of carbohydrate appears to be held up at the pyruvic acid stage; this leads to an accumulation of this substance. The exact precursor of pyruvic acid and its normal fate, oxidation or re-synthesis, is at present obscure. The fact however of its appearance in the tissue in this condition is all that need concern us in this preliminary report.

This discovery led to an estimation of pyruvic acid in the blood of pigeons suffering from vitamin-B_1 deficiency. Thompson and Johnson (1935) found the blood pyruvate to be increased from a normal value of 3.46 mg. to 11.31 mg. per cent in affected animals. The method they employed, namely, the bisulphite-binding power (henceforth B.B.P.) is not however specific for pyruvic acid, but Johnson (1936) later isolated pyruvic acid as the 2.4 dinitrophenylhydrazone. Platt and Lu (1936)

(Continued from previous column)

fungus group of the Phycomycetes, suborder Chytridineæ, and provisionally near the Olpidiaceæ.

It is as yet undetermined whether the organism found in Poona and the neighbourhood, with such strong affinity for water, may not belong to an allied but a separate sub-group of its own.

Compiled from my notes on the cases seen and treated at the Sassoon Hospitals, Poona, and published with the permission of and thanks to the Civil Surgeon, Lieut.-Col. R. H. Candy, I.M.S., Poona.

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in China investigated the B.B.P. of the blood of patients suffering from beri-beri and other conditions and showed that the B.B.P. was increased from a normal figure of 3 to 4 mg. to about 11 mg. per cent in cases showing clinically varying degrees of beri-beri. They found, however, that not all the B.B.P. in every cases was due to pyruvic acid, in contrast to the finding in pigeons with experimental vitamin-B deficiency. They suggested that similar observations might be carried out in cases of epidemic dropsy (often called beri-beri in Bengal) which has at times been thought to be associated with a vitamin-B deficiency.

Dr. L. E. Napier, who had seen some of Platt and Lu's work when he visited the Lester Institute at the time of the Far Eastern Association of Tropical Medicine meeting of 1934, drew the writer's attention to Platt and Lu's paper and suggested that, as well as in cases of epidemic dropsy, the test might be carried out on a number of his cases of anæmia and in normal persons of the same class, as it had been shown that vitamin-B deficiency was the cause of a type of macrocytic anæmia that occurred in Bombay (Wills, 1931), and he himself had found that a diet rich in vitamin-B complex effected a cure in certain cases of anæmia in Bengal (Napier, 1936). The majority of the bloods tested in this investigation were from patients of the hospital attached to the Calcutta School of Tropical Medicine, and the necessary clinical data were supplied by him. The cases investigated included epidemic dropsy, anæmia, malaria (without anæmia), splenomegaly, and diabetes. In addition blood from five healthy well-to-do Indians and one European was investigated in order to compare the normal standard B.B.P. of the blood with that obtained by Platt and Lu.

The B.B.P. in the blood was determined by the method of Clift and Cook (1932), so that the results might be comparable with those of Platt and Lu who used the same technique. The essentials of the method consist of forming the bisulphite compound of pyruvic acid, aldehydes or ketones, hydrolyzing it with sodium bicarbonate, and estimating the released bisulphite by titration with a standard iodine solution.

The data obtained from the five groups of patients and one normal group are given below:

TABLE

Group A Normal	Group B Malaria without anæmia	Group C Anæmia	Group D Epidemic dropsy	Group E Diabetes	Group F Splenomegaly
3.23	3.39	5.80	8.90	6.2	5.2
3.25	3.51	6.60	8.40	6.3	5.35
3.70	3.70	5.70	8.30	6.9	5.3
2.9	3.60	6.85	8.30	..	..
3.55	3.8	5.90	8.42	..	..
3.66	..	5.10	7.69	..	..
Average 3.38	Average 3.58	Average 5.99	Average 8.33	Average 6.47	Average 5.28

It will be noted that the highest average B.B.P. is found in cases of epidemic dropsy. The figure is also considerably increased in cases of anæmia, splenomegaly, and diabetes. The differences between malaria (without anæmia) and the normal are the only ones which are not statistically significant by Fisher's 't' test. We do not, however, lay too much stress on all the results, bearing in mind the fact that the method is not specific for pyruvic acid. In the diabetics, for instance, it is possibly due to traces of acetone in the blood. The fact that most groups of patients show an increased B.B.P. of the blood may be due not so much to the disease itself as possibly to the fact that the hospital class are all suffering from a variable degree of vitamin-B_1 deficiency. It would appear, however, that in the cases of epidemic dropsy and anæmia there is an unmistakable increase in the B.B.P. of the blood. This may be due to the presence of some substance or substances, pyruvates, methylglyoxal or aldehydes, which are increased in the blood in these conditions. Previous work in this laboratory has shown that the blood uric acid in epidemic dropsy, as estimated by the arseno-phosphotungstic acid reagent of Benedict and Franke (1922), is increased. We tested a solution of pyruvic acid which probably contained allied substances usually found in association with pyruvic acid, and observed that it gave a slight colour with the uric acid reagent. It would then tend to confirm the observation that there is some substance or substances present in abnormal amount in the blood in epidemic dropsy. This substance combines with bisulphite and possibly reacts to a certain degree with the arseno-phosphotungstic reagent.

Further work will have to be done in order to find out whether it is due primarily to pyruvic acid, methylglyoxal or some other substance. Whether our findings indicate a deficiency of vitamin B_1 or an allied vitamin cannot

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be stated at present. It should be pointed out again that Platt and Lu found that in many cases the total B.B.P. of the blood of beri-beri patients could not be accounted for entirely as pyruvic acid, in contrast to the findings in experimental beri-beri. It is possible that epidemic dropsy and some of the anæmias may be associated with partial deficiency of this vitamin or its imperfect absorption and/or utilization in the tissues. It is proposed to take up the question of the vitamin-B_1 excretion and saturation of patients in order to obtain more information on this point.

In regard to the anæmias it is premature to make definite statements. The increase in the B.B.P. of the blood, although much less than in the cases of epidemic dropsy, was nevertheless nearly double the normal value. In view of the fact, however, that some of the anæmias in this country can be cured by a good diet (Napier, 1937) or by protective foods, such as marmite (Wills, 1931), which is rich in all the vitamins of B group, the findings recorded here are of interest. At the present time some six different factors have been obtained from yeast; some are necessary for man, others for rats or birds. It is possible that all—in varying proportion for the different species—are necessary for normal health. The incidence and clinical expression of a deficiency may vary according to the relative proportion of the different factors of the B group in the dietaries concerned. This conception is not new, in view of the fact that there is a certain amount of evidence for the existence of more than one form of vitamins A and D.

Conclusions

1. The bisulphite-binding power is increased in the blood of cases of epidemic dropsy, anæmia, splenomegaly and diabetes.

2. The significance of those findings in relation to a vitamin-B_1 deficiency is discussed.

3. The possibility that different deficiency diseases may be due to the relative lack of one of the several components of the vitamin-B complex is discussed.

We desire to acknowledge the help of Mr. Swarup for checking the statistical data.

Protocol on the statistical treatment of the figures

In order to find out if the differences in the five groups are significant when compared to the normal, group A, Fisher's 't' test has been applied, *viz* :—

$$t = \frac{(\bar{x}_a - \bar{x}_i)}{s\sqrt{\frac{1}{N_a} + \frac{1}{N_i}}}$$

(*Continued at foot of next column*)

THE EGGS OF *TÆNIA SOLIUM* AND *TÆNIA SAGINATA*

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IN a recent search of the literature for records of *T. solium* in India several papers were found in which infection with this parasite was distinguished from that of *T. saginata* by stool examination when only eggs were seen.

The generally accepted teaching is that *T. solium* eggs are globular and *T. saginata*

(*Continued from previous column*)

where $\bar{x}_a$ denotes the mean of the normal group.

$\bar{x}_i$ denotes the mean of any other group (i varying over groups).

s is the pooled estimate of the variance obtained from the following formula :—

$$s^2 = \frac{S_a\,(x_a - \bar{x}_a)^2 + S_i\,(x_i - \bar{x}_i)^2}{(N_a - 1) + (N_i - 1)}$$

where N_a denotes number of observations in the normal group.

N_i denotes number of observations in the other group.

The value of 't' taken in conjunction with the degrees of freedom (two less the number of observations of both groups) will show from statistical tables whether the difference is significant in each case.

Groups	't'	Degrees of freedom	
A and B	1.2903	9	Not significant.
A and C	9.0218	10	Significant.
A and D	24.324	10	"
A and E	13.205	7	"
A and F	10.1442	7	"

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eggs are oval; how general is this idea may be gathered from the table below, which has been compiled from a fairly comprehensive list of standard books dealing with parasitology.

A gravid segment from a *T. solium* and a similar one from a *T. saginata*, both of which had been identified by examination of other gravid segments, and the heads were dissected

TABLE

Author and book title	*T. solium* *	Remarks	*T. saginata* *	Remarks
Neumann and Meyer. *Lehmann's Medizinische Atlanten.* 1914.	31–36	Round	30–40 × 20–30	Oval.
Stephens, Fantham and Theobald. *Animal Parasites of Man.* 1916.	31–36	Globular	30–40 × 20–30	Do.
Castellani and Chalmers. *Manual of Tropical Medicine.* 1919.	31–38	Do.	30–40 × 20–30	Do.
Rivas. *Human Parasitology.* 1920 ..	31–38	Almost spheric	30–40 × 20–30	Somewhat larger and oval.
Byam and Archibald. *Practice of Medicine in the Tropics.* 1923.	31–36	..	30–50 × 20–30	..
Baylis. *Helminthology, Medical and Veterinary.* 1929.	31–36	..	30–50 × 20–30	..
Faust. *Human Helminthology.* 1930 ..	31–38	Spherical or sub-spherical.	30–40 × 20–30	..
Brumpt and Neveu-Lemaire. *Travaux Pratique de Parasitologie.* 1933.	31–56	Globular	30–40 × 20–30	Ovoid.
Mönnig. *Veterinary Helminthology and Entomology.* 1934.	42	Spherical, rarely ovoid.	45–48 × 43–45	Ovoid, rarely spherical.
Manson-Bahr. *Manson's Tropical Medicine.* 10th ed. 1935.	31–56	Globular or slightly oval.	30–40 × 20–30	More or less globular.
Chandler. *Introduction to Human Parasitology.* 5th ed. 1936.	35–42	Rarely spherical	30–45 × 20–30	More oval than solium.
Brumpt. *Précis de Parasitologie.* 5th ed. 1936.	31–56	Globular	30–40 × 20–30	Ovoid.

* All measurements in *microns*.

With the exception of Mönnig in the above list of authors it can be reasonably inferred that the measurements of the eggs of these two species of tapeworm have been copied from book to book without any attempt to confirm the particulars given. In the literature available it is not possible to find who first published the statements but at least they date from 1908, the fourth edition of Braun's 'Die Tierschen Parasiten des Menschen', for it is from this that much of 'The Animal Parasites of Man' by Stephens, Fantham and Theobald was translated.

Two other books, Southwell (1930) and Blacklock and Southwell (1935), have not been included in the above list because they make the revolutionary statement that the eggs of these two parasites are indistinguishable. When it is noted that the first of these two books appeared in 1930 and that five of the books cited above were published three or more years later it seems that Southwell's statement has been missed by the authors concerned or it is disbelieved and has therefore been ignored. As far as the writer is aware Southwell has never published any detailed observations to prove his remark so it is possible this is why it has not been referred to in other works. It is with the object of emphasizing and drawing attention to what is an important correction in a practically universally held belief that the following small research has been carried out.

and a number of the eggs placed on slides in water. One hundred eggs, taken as they appeared in the microscopic field and without selection, were measured in two diameters, the longest and shortest. Both worms had been in formalin for a year or two, but this is of no importance as tapeworm eggs remain unaltered indefinitely, in properly preserved material. The eggs were measured under a one-sixth objective combined with an eyepiece micrometer that gave a total magnification of approximately 300 diameters. Each division of the micrometer was 3·9 μ, and in measuring the eggs differences of approximately 1 μ were recorded by estimating, when both edges of an egg did not coincide with two of the scale divisions, whether it extended for $\frac{1}{4}$, $\frac{1}{2}$ or $\frac{3}{4}$ of a division. In giving the results it was found advisable to combine the measurements in groups representing one division of the micrometer scale, that is about 4 μ, as this smoothed out any apparent discrepancies that showed when individual variations of 1 μ were taken, on account of the relatively small number in each group in the latter case. All the maximum and minimum diameters of the hundred eggs for each species are taken together and appear in the table as the numbers in one hundred measurements.

In addition to these hundred eggs for each species one abnormally large egg measuring 50 × 43 μ was noted in the *T. saginata*, and in the *T. solium* slide one egg was seen with a

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TABLE

Size of diameter	MAXIMUM		MINIMUM	
	T. solium	*T. saginata*	*T. solium*	*T. saginata*
31–34 μ	4	5	57	58
35–38 μ	28	39	43	42
39–43 μ	66	54	0	0
Over 43 μ	2	2	0	0

minimum diameter of 30 μ; this was the smallest egg seen. The latter observation is of interest when it is remembered that the shorter diameter of *T. saginata* is practically universally recorded as 20 to 30 μ, well below the shortest diameter noted in this investigation with one exception.

If the grouping is slightly altered from that given in the table and the eggs with minimum diameters of 32 to 35 μ are taken together it is found that 81 *T. solium* and 86 *T. saginata* eggs fall within it. During this examination three *T. solium* and six *T. saginata* eggs were measured which showed diameters equal in both directions, that is they were apparently globular. In the case of *T. saginata* the six eggs were all between 33 and 35 μ in diameter, two of the *T. solium* eggs were 35 μ and the other was 32 μ. That is, these eight eggs are all in the group containing over 80 per cent of the recorded minimum diameters, so it is suggested that eggs with equal diameters in both directions are possibly oval eggs that are being viewed end on, and that consequently only the minimum diameter is visible. It is a common experience in examining hookworm eggs in large numbers, as in the course of counting, to see an occasional egg that is lying in this position and therefore has a circular contour, but no one has yet suggested on this account that some hookworm eggs are globular.

The coincidence in the measurements of the eggs from these two worms is so remarkable that it was not considered worth while measuring more than one hundred of each to establish the fact that, for practical purposes, they are indistinguishable.

Conclusion

The statement by Southwell (1930) that the eggs of *T. solium* and *T. saginata* are indistinguishable has been shown to be correct, and a study of the literature has revealed an excellent example of the all too common habit that authors have of taking a statement from older publications and copying it year after year without it being put to the proof of correctness.

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THE GIANT-CELL TUMOUR OF BONE

(WITH A REPORT OF SIX CASES)

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AMONGST all the controversies regarding the classification of osteogenic neoplasms, the giant-cell tumour, under one name or another, has always remained a distinct entity. In fact, the subject of contention in this connection has been the nomenclature of this distinct variety of tumour formation in the bone which, though locally destructive, practically never presents any of the general features of malignancy. It has been very widely known as the myeloma of bone, but to differentiate its origin from the osteopoietic tissue of the bone as distinct from the multiple myeloma arising from the hæmopoietic tissue in the bone-marrow this term has been found to be rather unsatisfactory. The appendage of *sarcoma* as in myeloid sarcoma and giant-celled sarcoma is a misnomer and, besides leading to confusion, gives the tumour a serious prognostic outlook which is far from being correct. Osteoclastoma—the name recently suggested by M. J. Stewart—begs the question of the origin of the giant cells in the tumour, and, so long as this question as to whether they arise from the osteoclasts or the endothelial cell of the bone remains *sub judice*, this nomenclature is rather unacceptable. The consensus of surgical opinion is that the term giant-cell tumour suggested by the American registry of bone sarcoma is satisfactory though not perfect, and among the other tumours of the bone containing giant cell this remains a distinct entity.

The nomenclature is made more difficult because of the lack of definite knowledge regarding its ætiology which is no exception to the vexed question of the ætiology of tumours in general. It occurs equally well in adult men as well as women and is rarely known to occur in children. It has practically no causative connection to trauma of any nature, though a history of trauma is often obtainable. It is rather accidental than causative.

The giant-cell tumour may be periosteal arising from the periosteum of the upper or the lower jaw where it constitutes one variety of epulis, or it may be medullary in type arising from the endosteum of the extremities of certain of the long bones such as the head of the tibia, lower end of femur, upper end of humerus, lower end of radius, upper end of fibula and occasionally at the sternal end of the clavicle. Rarely it is found to occur at the non-osseous sites such as the tendon sheaths, bursæ and capsule of joints. The endosteal form occurs in the diaphyseal end of one of the long bones mentioned above, where the affected part is expanded to form a tumour of varying size. The tumour is somewhat rounded in shape, the bone appearing

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to expand more or less equally in all directions or it may project more in one direction than the other. It is covered by periosteum and the bony shell underneath may be so thinned out that a sensation of egg-shell crackling is obtained on pressure with the finger.

The cut surface usually exhibits a uniformly dark-red appearance owing to its great vascularity and the presence of blood clots. More frequently it looks somewhat mottled like the cut surface of a pomegranate, the lighter areas indicating the sites of old and altered blood clots or of patches of degenerated necrotic tissue. With advancing degeneration, cysts containing a brownish fluid form inside the tumour. Round the periphery of the growth is a narrow zone of more solid tissue, pinkish-white in colour, indicating a zone of more active tumour growth. This has a low local malignancy destroying the shell of overlying bone. New bone is formed from the osteogenic shells of the periosteum to form a new bony wall to the tumour. The bony shell of the tumour is thus re-formed from the periosteum after destruction by the tumour growth, or it is possible that it is the expanded remnant of what was once the wall of the normal compact bone. The remains of the cancellous tissue may be represented by a few odd spicules of bone scattered irregularly in the pulp of the tumour.

The periosteal variety grows from the alveolar margin of the jaw in the form of a hard, more or less pedunculated growth covered by mucous membrane unless it is ulcerated.

Histologically, the tumour is made up of spindle-shaped cells without hyperchromatic nuclei. But what catches the eye most is the presence of large numbers of giant cells of different sizes, numerous in one part of the microscopic field and scanty or absent in another. The giant cells possess numerous small oval nuclei situated towards the centre of the cells and not around the periphery as in tuberculosis. The cytoplasm is opaque, abundant, and basophilic. These have the general characteristics of foreign-body giant cells and may be large osteoclasts or may be derived from the endothelial cells of the bone. No atypical forms are seen as in sarcomas. Numerous wide thin-walled blood vessels are seen with extravasated erythrocytes showing the tumour to be highly vascular. Some areas may reveal the remains of the osseous lamellæ homogeneous in appearance and stained red by eosine, patches of myxomatous and fatty degeneration and areas of necrosis with feebly-stained cells and degenerating nuclei.

Osteitis fibrosa cystica, first described by von Recklinghausen in 1891, seems to have a direct relationship to the giant-cell tumour of the bone. Cases have been described from time to time (like case 6 herein reported) where different portions of the same tumour present the typical appearances of the giant-cell tumour and of the fibrocystic disease of the localized type. Cysts form in both conditions and typical giant cells, as in the giant-cell tumour, are often found in the walls of the cysts in the localized fibrocystic disease of bone. Typical giant-cell tumour is also known to arise from a previous case of localized fibrocystic disease, as is probably the case in case 3 herein reported. Pathologically many American authorities, notably Ewing (1922), consider the giant-cell tumour as a separate variety derived from a common condition—osteitis fibrosa cystica.

Bloodgood (1910) and others consider the fibrocystic disease to be essentially inflammatory in origin, *i.e.*, a low-grade form of osteomyelitis. Or it may be one of the obscure disorders of calcium metabolism due to hyperactivity of the parathyroid glands. Phemister and Key (1933) suspect a low-grade infection and claim to have cultured the infective organisms from the cyst wall of some of their cases.

The direct relationship between osteitis fibrosa cystica and the giant-cell tumour, as explained above, makes one agree with Barrie who considers the process in the giant-cell tumour to be inflammatory and not neoplastic, and to him it is a chronic hæmorrhagic osteomyelitis. Considerable evidence is also accumulating to show that the bone cysts and possibly the giant-cell tumours are due to the hyperactivity of the parathyroid glands.

The condition is essentially chronic in nature. The patient complains of slight fleeting pain, but never severe as in sarcoma, of a swelling in one of the usual sites of tumour, or he may consult for a fracture of the bone due to some very trivial accident or violent muscular movement. Thus pain, swelling, or spontaneous fracture form the three essential symptoms of the condition.

On examination, a tumour of varying size is discovered in one of the usual sites of the condition, towards the ends of the bones. It is more or less rounded in shape, situated more on the diaphyseal side of the end of the bone, though the epiphysial side may also be involved by the local destructive process. The articular cartilage remains more or less intact and movements of the joint may be obtained but for the mechanical impediment due to the size of the tumour. The adjacent joint may contain slight fluid as a result of synovitis. The tumour may be hard, soft, or fluctuating giving an egg-shell crackling according to the extent of degenerative processes and bony destruction by the subjacent tumour growth. Blue telangiectatic veins may be present coursing over the subcutaneous surface of the tumour, caused by mechanical pressure of the tumour on the main venous channels, and rarely the tumour may be hot and pulsating due to the highly vascular nature of the tumour. More rarely still it may have ulcerated presenting a raw red fungating ulcer on the surface exuding a sanious fluid or

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even blood and presenting a hæmorrhagic appearance. The bone distal to the tumour is normal and there may be a fracture at the site of the tumour. The distal portion of the limb is usually normal but may occasionally be œdematous from venous obstruction. The general condition of the patient is good except for any secondary infection from an ulcerated tumour. The urine is normal and does not contain Bence-Jones protein, which is only found in cases of multiple myelomata and in some cases of generalized fibrocystic disease.

X-ray shows the end of the bone expanded with the rest of the diaphysis normal and with no inflammatory periostitis round the tumour. The expanded shell of bone may present varying grades of thickness with the lamellæ of bone traversing the matrix and dividing it up into cysts of different size and number, giving the whole tumour a honeycombed appearance. The lower limit of the tumour appears rounded and cut off distinctly from the rest of the diaphysis. Fracture, if present, is detected by the discontinuity in the length of the bone, and when the bony shell growth is notable, to keep up with the destructive process of tumour growth, the shells of bone appear as islets of thinned out bone with discontinuity of bone surface.

The diagnosis is rather difficult even with the help of *x*-ray pictures. It has to be differentiated from the other bone conditions of a similar nature, such as the Brodie's abscess, tuberculosis, and gumma of the bone, the many varieties of sarcoma, secondary carcinoma and the occasional hydatid cyst in the bones. Rarely enough it may be mistaken for osteomyelitis. A systematic examination together with *x*-ray will go a long way to help to arrive at the correct diagnosis of the condition. Difficulty arises in differentiating it from fibrocystic disease because one may develop into the other or both may be associated together in the same condition.

The treatment is essentially conservative in nature. Local excision removes the growth, and in cases where portion of the compact bone can be saved partial excision with thorough curettage of the tumour tissue together with swabbing the residual bony cavity with carbolic and alcohol or iodine will be sufficient to ensure a permanent cure of the condition. Recurrences are rare or uncommon. Where the tumour occurs in single bones of the limb excision will leave the distal portion of the limb unsupported. A successful bone graft has saved many a limb in such cases. However this has to be considered more seriously in the case of the lower extremity where the question of weight-bearing has to be specially considered. When it is highly doubtful whether this will be possible, amputation of the limb will have to be resorted to, but in all cases amputation must be regarded as a last resort. Even in cases of the lower extremity conservative measures with bone grafting, if necessary, may be given a trial in the first instance and amputation resorted to only if it proves a failure. The recuperative and compensatory processes of nature are well known to be far beyond the ken of human judgment and it is always advisable to give the patient the benefit of the doubt. However perfect an artificial limb may be it is hard to compare it with nature's handicraft, not to speak of the sentiments of the patients. However, in really hopeless cases there is no use stretching the argument to the extreme and submitting the patient to the risks of operation twice. The surgeon's responsibility is thus enhanced in arriving at the correct decision in the matter of amputation.

The following cases tend to throw some light on some of the problems that present themselves to the surgeon when dealing with the varieties of this condition.

Case 1.—Patient A., aged 18, male, was admitted into the hospital in May 1933 with a tumour on the upper end of the left humerus. The duration of the disease was 13 months. He had slight pain, but not so severe as to interfere with his work.

The tumour was large and rounded, of the size of a tennis ball, occupying the whole of the upper end of the humerus including the epiphysial region. The surface veins were evident as blue lines coursing irregularly over the surface. There was slight pulsation on palpation as also egg-shell crackling. The rest of the humerus felt normal, as also the distal portion of the limb. There was slight limitation of movement at the shoulder only due to the size of the tumour.

X-ray showed a typical giant-cell tumour of the upper end of the humerus.

The patient refused operation and absconded. Local excision of the tumour with a bone graft from the tibia as in case 6, below, would have cured the disease and at the same time saved the limb.

Case 2.—Patient B, aged about 36, female, was seen by me in October 1933 on account of a fall she had and consequent injury to her right knee. She had pain in the upper end of the tibia for about a year. She had consulted doctors who after proper examination and *x*-rays had diagnosed the condition as a giant-cell tumour of the upper end of the right tibia. On examination the region of the knee joint was swollen and the skin discoloured. It was warm on palpation and there was distinct egg-shell crackling on the outer aspect of the upper end of the tibia in front of the head of the fibula. It was very tender and the knee joint was distended with fluid. There was rather free movement at the knee joint limited only by the synovitis and the tenderness due to the injury. There was slight œdema of the leg distal to the knee. *X*-ray showed a typical giant-cell tumour on the upper end of the right tibia, with the shell of bone intact and with no fracture of the bone.

The knee joint was aspirated and about two ounces of thick blood-red fluid were removed. Lead lotion was applied and the knee joint kept at rest. The inflammation subsided gradually and the joint was kept at rest in a stiff knee cage and the patient not allowed to walk about.

On further consultations the consensus of surgical opinion was that amputation at the lower third of the thigh was the only safe treatment feasible because it was the tibia that was affected and that after any local excision there would not be proper support for the leg to bear any weight. The patient was averse to operation of any sort and was much less willing for amputation.

However I advised a conservative operation in the first instance and that the radical amputation could be

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done if this were to prove a failure. After due consideration the patient consented to the operation and the further course of the case showed the wise move she had adopted.

She was operated on in December 1933. The great danger at the time of the operation is hæmorrhage and the later danger is infection. The latter makes the healing process long and tedious and kills the bone graft, if any. All steps were taken to effectively prevent the advent of any secondary infection together with the no-touch-technique throughout the operation. A tourniquet was applied to the middle of the thigh to control the hæmorrhage and in fact at the end of the operation she had lost less than two drams of blood. Pure chloroform was used as the anæsthetic. Since the patient was very nervous there was no question of using local or spinal anæsthesia and since she had a history of pleurisy and tuberculous glands in the neck ether as an anæsthetic was strictly avoided.

An external linear incision four inches long was made stretching downwards from the level of the knee joint. Particular care was taken not to open the joint. The bone was freely exposed and a shell of bone one and a half inches in diameter was punched out from the outer condyle of the tibia in front of the upper tibio-fibular articulation. The whole of the tumour-laden cavity was thus laid open. The tumour mass was thoroughly scooped out until bare bone was felt in the posterior medial and lower aspects. Towards the articular aspect the less hard articular cartilage was felt, and particular care was taken not to damage the integrity and continuity of this. The whole cavity was then swabbed with phenol and then with rectified spirit. A few chips of bone were chiselled out from the middle of the shin of the same tibia and these were packed into the bony cavity left behind. A flap from the peroneal muscles was also separated distally and turned up into the cavity so as to fill in the same. The wound was sutured over in two layers with interrupted stitches and dressed. A back splint made of a plaster-of-paris slab was applied stretching from the middle of the thigh to the sole of the foot so that the knee and ankle joints were both immobilized. The tourniquet was then removed. The patient had an uninterrupted recovery with a maximum temperature of only 99.5°F. for three or four days. The stitches were removed on the tenth day and the whole limb put in plaster-of-paris casing from the middle of the thigh and including the foot.

Since it was rather uncomfortable the plaster casing was slit up two weeks later into two halves, upper and lower, and the limb still kept immobile. Two weeks later passive movements were started for the ankle joint and five days later for the knee joint also. In six weeks the patient was able to sit up in bed and move the joints herself, with the use of the back splint only at nights. In two months the splint was completely removed. The site of the tumour was hard to the touch and the outer condyle of the tibia felt hard and rounded. There was little or no pain. Medical diathermy and ultra-violet-ray exposures were given for about a week. She was allowed gradually to bear weight on the affected leg, first with the help of a stick and later without it.

Pathological examination of the growth removed at the operation showed typical giant-cell tumour with no suspicion of malignancy at all.

In June 1934 surface application of radium was made so as to destroy by its radiations any more tumour tissue that might be present. *X*-rays have been taken every month or once in two months regularly and a little honeycombing is found to persist on the outer aspect. I am inclined to think that this is due probably to the muscle graft that has been put in. Deep *x*-ray therapy to the part will help a great deal to drive off any more suspicion of recurrence of the tumour.

Clinically, the upper end of the tibia is now hard with no feeling of any cavity or thinned-out bone, and the movements of the knee joint are quite free. She is walking about now, climbs stairs by herself and is just as strong on her leg as ever before.

Case 3.—Patient C., aged about 45, female, came to the hospital in December 1933 with the history of her right leg giving way while climbing stairs and spraining her thigh muscles. On examination there was a fracture of the middle of the right femur and the history was suggestive of a spontaneous fracture. *X*-ray confirmed the fracture with slight lateral displacement of the fragments. It further showed an area of rarefaction with cavities in the bone. There was no primary malignant tumour anywhere and the patient was otherwise healthy. A tentative diagnosis of fibrocystic disease was made and an operation advised.

A local excision of the affected part of the bone on both sides of the site of fracture was made and about three inches of bone thus removed. The ends of the bone were brought together and plated. The wound was closed in two layers and the limb put in plaster-of-paris casing including the hip and the foot. The patient had slight temperature of 100°F. for two or three days and had an uninterrupted recovery. In two months she was able to move the limb herself, with a shortening of three inches.

The excised part of the bone showed five or six cysts and the cysts wall showed on microscopic examination giant cells typical of giant-cell tumour. This is probably an instance where the condition started as a fibrocystic disease and developed the tendencies of giant-cell tumour later on. The two are probably different appearances of the same pathological process and it is hard to know where one ends and the other begins. Further evidence is of course required for proof of this.

She was walking about with the aid of crutches and was advised to undergo another operation to shorten the femur of the opposite side. She refused however and was later lost sight of.

Case 4.—Patient D., aged about 25, female, came to the hospital in April 1934 with a hæmorrhagic ulcer on the radial aspect of a swelling of the lower end of the right forearm. The duration of the disease was about six months. The tumour was pear-shaped and of the size of a small orange. It looked like a sarcoma of the lower end of the radius, but *x*-ray showed an expanded lower end of the radius with the rest of the diaphysis normal. There was discontinuity of the bony shell on the radial aspect where the ulcer was present. The ulna was normal in appearance. Her general condition was on the whole good. A tentative diagnosis of giant-cell tumour of the lower end of the radius was made. The ulcer was dressed with eusol for two or three days and it was then clean.

A week later a local excision of the tumour was done, a bone graft four inches long from the right tibia was inserted and the limb put in a plaster-of-paris pad with the wrist dorsiflexed. The wound however got septic, the graft was dead and had to be removed. The septic wound healed in six weeks and the patient was discharged with a deformed limb. No pathological examination of the specimen could be done.

Two months later the patient came back again with a sarcoma of the lower end of the ulna and the limb was then amputated at the lower third of the humerus.

The initial tumour was a sarcoma to start with and had probably affected the ulna also at the time; or the sarcoma of the ulna may be an independent process altogether. The lack of pathological evidence of the first specimen leaves the whole thing in doubt. The bone graft should have been avoided at the time of the primary operation, because of the ulcerated condition of the tumour and the impossibility of avoiding post-operative suppuration.

Case 5.—Patient E., aged 18, male, was admitted into the hospital in January 1934 with a swelling of the lower end of the left thigh and knee and with a sinus on the internal aspect of the knee exuding pus mixed with a sanious discharge.

The history was as follows:—He had a feeling of numbness in his leg for five months and there was also a swelling in the lower part of the thigh. One day he felt something breaking near the knee joint and was not able to move the joint after that. He went to a

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doctor who diagnosed the condition as an abscess probably due to osteomyelitis. He incised on the inner aspect but could get only blood and no pus. He dressed the case for a month and a half and sent him to the hospital. The sinus on the medial aspect was the result of the operation. He had also developed a bed sore over the posterior aspect of the sacrum.

The whole part including the distal portion of the limb was hot, tender and œdematous and looked like cellulitis. He had a temperature of 103°F. on admission with a pulse of 130 per minute and his general condition was very toxic. The swelling was of the size of a big coco-nut, but the upper part of the femur was normal. There was no pulsation of the tumour on palpation. Twenty cubic centimetres of blood-stained fluid were aspirated from the knee joint. A large giant-cell tumour of the lower end of the femur with a pathological fracture were seen on *x*-ray examination. The tumour had overgrown the limits of the bony shell which only appeared as a few islets on the inner side.

The condition of the patient was so precarious that the only idea was to save his life. The limb was amputated at the middle of the femur and the flaps kept open. It was daily dressed with eusol, and anti-gas-gangrene serum was freely administered to prevent spreading infection. The patient gradually came round and on the 14th day after the operation the wound was closed with a side drain. He put on weight, the wound and the bed sore healed and he was discharged minus his left leg seven weeks after his admission into the hospital. I have heard from him since and he is quite well and has had no recurrence of the trouble.

Case 6.—Patient F., aged 20, male, carpenter by trade, was admitted into the hospital in October 1934 complaining of pain and swelling in the upper third of the right arm. The history was rather interesting. Seven years back he had a fracture of the upper third of the right humerus due to an injury. Three times after that he had fractured the same bone at the same site due to a fall from a camel. This time he was trying to throw a stick at a dog and felt his arm giving way at the same site.

On examination there was a fusiform swelling in the upper third of right humerus extending to the head of the bone. There was also a distinct fracture at the site. The shoulder joint was free. There was no temperature and his general condition was quite good. It was distinctly a pathological fracture.

X-ray showed a pathological fracture due to rarefaction from a cystic condition of the bone. A tentative diagnosis of fibrocystic disease of the humerus was made and the patient advised operation.

A local excision of the diseased portion of the bone left only the head of the bone above and the lower two-thirds of the humerus below with a gap of four inches in between. A bone graft four and a half inches long was removed from the right shin and was put into the medulla of the lower fragment below and into a scooped out cavity on the distal surface of the upper fragment above. The wound was then sutured in three layers with interrupted stitches and dressed. The whole of the upper right extremity was then put in plaster-of-paris casing with the limb in the 'aeroplane' position.

Pathologically the specimen removed showed distinct areas of giant-cell tumour and other areas of fibrocystic disease.

The patient had a temperature of 101°F. for three days and gradually came down to normal. He was able to sit and walk about in a week's time with the limb still in plaster. After six weeks the plaster was cut, the sutures removed and the limb put up in the same position in a gutter-shaped plaster pad applied only to the under aspect of the arm so as to support it, but the patient was allowed to try to lift the limb up from the pad once a day. Passive and active movements were started regularly a fortnight later. In another three weeks the splint was left off and the patient instructed to move the shoulder as much as possible with the help of the other hand, and to keep the arm to his

(*Continued at foot of next column*)

PROPHYLAXIS OF CHICKEN-POX BY INOCULATION WITH VESICULAR FLUID

By R. C. WATS, M.D., D.P.H., D.T.M.
MAJOR, I.M.S.

and

N. P. DALAL, M.B., B.S., D.P.H., D.T.M. & H.
(*Haffkine Institute, Bombay*)

THE majority of those in touch with chicken-pox consider it unnecessary to employ any prophylactic measures against the disease owing

(*Continued from previous column*)

side while sleeping. *X*-rays were taken at regular intervals. The graft was getting organized and the humerus becoming a solid whole. There was ankylosis at the shoulder joint and the movements of the head in the glenoid cavity of the scapula were getting restricted. However the scapular movements on the chest wall were making up for the loss of shoulder movements. He was discharged in May 1935 with no pain and the movements fairly free, but for the limitations at the shoulder joint as explained above. He was able to lift things with the right hand and to do light work. He came back again three months later and showed that he was able to do more heavy work with that hand. He was looking forward to do his carpentry work.

Conclusions

1. The direct relationship between the giant-cell tumour and the localized fibrocystic disease is shown and both the pathological conditions may be found in different parts of the same tumour.

2. The difficulty of differentiating the giant-cell tumour from an osteogenic sarcoma is demonstrated, especially when the tumour has ulcerated on to the surface.

3. The appearance of sarcoma in the adjacent bone after a tentative diagnosis and consequent local excision of the giant-cell tumour in the other is described.

4. The possibility of saving the limb by means of a bone graft where otherwise the limb would have been amputated is proved.

5. The need for amputation still exists in really hopeless cases.

N.B.—These cases were under my care when I was the Principal Medical Officer of Bikaner State, Rajputana, India.

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to its mildness and rapid spontaneous recovery. In some cases, however, the contagiousness of the disease interferes so much with the normal routine that the work comes to a standstill. As an example we might quote the instance of a training battalion in India, where the majority of the recruits were either suffering from the disease or were isolated as contacts. In such cases any practical method for prophylactic purposes would be very desirable.

Greenthal (1926) vaccinated 36 contacts with vesicular fluid from a case of chicken-pox; 19 of these showed a typical vesicle. None of the cases developed the disease but, as there were no controls, the experiment was inconclusive. Waddell and Eley (1927) vaccinated similarly 23 contacts, eight of whom developed the typical vesicle. There is no mention of controls in the series and it is quite probable that the majority of the vaccinated people were immune already as only 33 per cent developed the typical vesicle. Hisse and Unger (1928) injected 38 children intravenously with vesicular fluid after suitable dilution. Angarano and Gabriele (1931), following Fabris' technique, employed pure vesicular fluid as well as a 20 per cent dilution of the vesicular fluid intradermally for prophylactic purposes. The total number of cases thus protected was 12 with three controls. As two of the latter developed the disease there is some evidence that such a procedure may be of some value, but the number of cases is rather small.

A mild outbreak of chicken-pox was reported from I. M. M. T. S. 'Dufferin'. The first case reported sick on 13th February, and up to 31st March, 1936, there were 15 cases altogether. On the advice of the port health officer, it was decided to use the intradermal method, referred to above, to protect the contacts. Normal saline was injected for control purposes.

Difference in the technique adopted.—There is, however, one noteworthy difference between the technique referred to in the literature above and our own. In the former case the vesicular fluid was taken as such but we have filtered the diluted material in a Chamberland L3 candle to safeguard against any pyogenic infections. We have recorded this fact as we are not sure what effect the filtration has on the virus.

Experiment I

Material employed.—(1) The vesicular fluid was collected from two cases on the fourth day of the disease, suitably diluted to make a 20 per cent dilution with normal saline and filtered through a Chamberland L3 candle. (2) Normal saline (0.85 per cent).

Procedure.—An intradermal injection of 0.2 c.cm. of the appropriate solution was given on the left forearm.

Table I summarizes the result of the experiment.

TABLE I
Age group 14 to 18 years

Material employed	Total number inoculated	Local reaction	REMARKS
The vesicular fluid. 20 per cent.	64	Twenty-one (33 per cent) had erythematous patches slightly raised measuring on an average 1.5 centimetres.	Five of the 21 had headaches in addition to local reactions.
Normal saline ..	10	Three (33 per cent) had erythema as above.	No headache.

The controls as well as the vaccinated were observed for nine months but none contracted chicken-pox.

Experiment II

In the following experiment an attempt was made to ascertain if the serum from chicken-pox cases could be substituted for the vesicular fluid. The serum which was left over after the Wassermann test of the two cases (*see* experiment I) was diluted with normal saline to give a concentration of 10 per cent and filtered through a Chamberland L3 candle. Normal saline was used as control. An intradermal injection of 0.2 c.cm. of the appropriate solution was given on the left forearm.

The results are tabulated in table II.

TABLE II

Age group	Total number inoculated	Local reaction	REMARKS
		(*a*) Inoculated with the serum (10 per cent).	
14 to 18 years ..	21	Seven (33 per cent) had erythema as in experiment I.	No headaches.
20 to 50 years ..	44	Eight (17 per cent) had erythema as above.	Do.
		(*b*) Inoculated with normal saline.	
14 to 18 years ..	10	Three (33 per cent) had erythema as above.	Do.
20 to 50 years ..	48	Eight (17 per cent) had erythema as above.	Do.

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The controls as well as those vaccinated were observed for nine months but none contracted chicken-pox.

Summary and conclusion.—As there were no cases after the inoculation in any group, the value of the prophylactic measure cannot be gauged. It is evident that neither the vesicular fluid nor the serum of the patients collected on the fourth day, diluted and filtered as above, was capable of producing the disease after an intradermal inoculation. Amongst the vesicular-fluid group about 8 per cent had headaches in addition to the erythema, the other groups being free from this symptom.

This note was written as there seems to be a general impression that vaccination with the vesicular material checked the epidemic on board I. M. M. T. S. 'Dufferin'.

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A Mirror of Hospital Practice

FATAL CASE OF ACUTE GONORRHŒA (SEPTICÆMIA WITH ULCERATIVE* ENDOCARDITIS)

By P. V. KARAMCHANDANI, M.B., F.R.C.P.E.
MAJOR, I.M.S.
Officer in charge, Brigade Laboratory, Mhow, C. I.

RIFLEMAN N., aged 29 years, exposed himself to infection at Indore on 27th October, 1935, and noticed a urethral discharge on 29th. About the 12th November he noticed a papule on the dorsal aspect of the penis under the prepuce, which eroded and formed into a sore before his admission to the Indian Military Hospital, Mhow, ten days later.

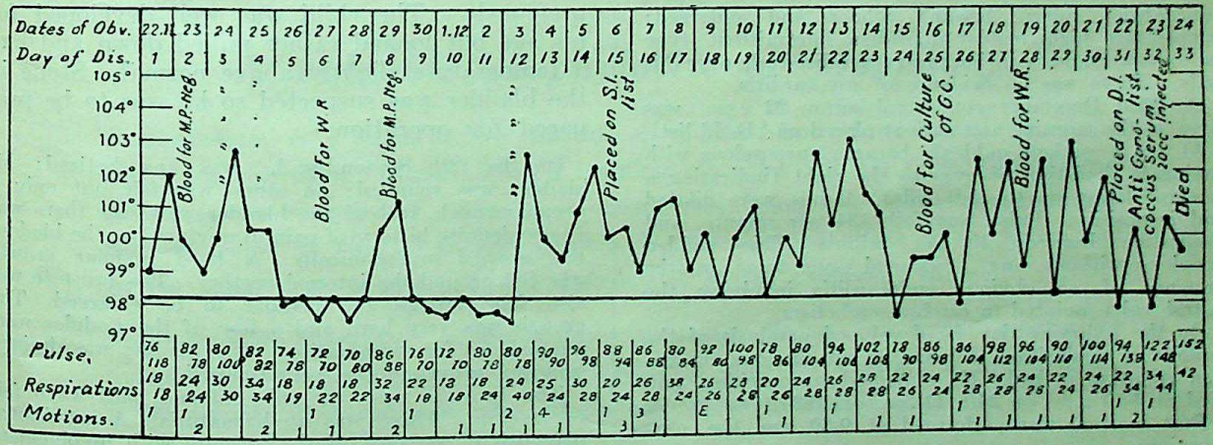
The sore, on admission, was found to be indolent and painless, with surrounding infiltration. Urethral discharge was purulent, yellow and thick. Epithelial cells, gonococci and pus cells were in large numbers, the last being in great excess, which suggested that he had had gonorrhœa for three weeks without treatment. He had a bubo in the right groin, without signs of acute inflammation or redness of the overlying skin. Spermatic cords, testicles, Cowper's glands, prostate and seminal vesicles showed no abnormality. There was nothing abnormal in the urine except that the 2-glass test showed turbidity in both glasses, indicating anterior and posterior urethritis.

His temperature was 99°F., pulse 76 per minute, respiration 18 per minute. There was nothing abnormal in any of his systems. He had a roseolar rash, pinkish in colour, extending over trunk and limbs, more marked on the latter, it looked like the prepapular rash of early secondary syphilis.

He was given the following treatment:—

1. Milk diet and barley water freely.
2. Potassium permanganate lavage 1 in 20,000 B.D. (anterior irrigation pint 1, posterior pints 2, strength to be gradually increased to 1 in 8,000).
3. Calomel grs. 2 at bed time. Mist. salina oz. 1 next morning.
4. Hot fomentations over the bubo four-hourly.
5. Saline dressing over the sore.
6. Tincture belladonna .. .. min. v
   Potassium citrate .. .. grs. xv
   Potassium bicarbonate .. .. grs. xv
   Tincture hyoscyamus .. .. min. xv
   Infusion buchu .. to oz. 1
   Sig. oz. 1, t.i.d.

23rd November.—Blood film was negative for malarial parasites and the dark-ground examination of exudate from the sore on the penis revealed no spirochætes.



Until the 3rd December the patient had no special complaint. Rectal examination revealed no enlargement or tenderness over the prostate. His temperature kept normal except for rises on 24th, 25th and 29th of November which was probably due to the rash. The blood was strongly positive to the Wassermann reaction on 26th November.

On the 3rd December, patient had a sudden rise of temperature to 103°F., complained of discomfort on micturition with increased frequency. Urine showed turbidity in all the four glasses. He was given a dose of saline mixture and alkaline mixture four-hourly.

Barley water and glucose water (5 per cent) not less than 4 pints in 24 hours.

Next day the patient developed prostatitis. He looked definitely ill. Urethral discharge had diminished, and the smarting sensation during micturition had

* Abridged by Editor.

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increased and his prostate was found to be tender on rectal examination. His blood showed no malaria parasites and the differential leucocyte count was: polymorphonuclears—70 per cent, lymphocytes—23 per cent, large monocytes—7 per cent.

Lungs were clear, heart showed nothing abnormal, liver and spleen not enlarged.

He was given (1) urodonal 1 drachm three times daily, (2) hot Sitz bath for 20 minutes twice a day, (3) rectal lavage with boric lotion (temperature 116°F.) directed on the prostate, three times a day, (4) hot fomentations to perinæum four-hourly. All routine urethral treatment was stopped. He showed no improvement, developed aching pains in the chest and limbs and was put on 'S. I.' list on 6th December.

By 7th December he had developed vesiculitis and orchitis, and was given (1) suppository of atropin gr. 1/75 with extract belladonna gr. 1/4 at bed time, and (2) application of glycerine-belladonna locally over testicles.

Up to the 10th December the patient felt better and micturition was easy. But that was perhaps the period when migration and settlement of infection was occurring in distant parts, because on the 11th he developed acute arthritis in the right knee joint. There was no swelling or effusion, but great pain on movement of knee joint.

Sulpharsphenamine 0.12 gramme was given intravenously and antiphlogistine applied over knee joint.

On 12th December both the knee joints were painful, while on 16th arthritis had extended to all the joints of the body, the knees, shoulders and right elbow being the worst. Blood was taken for culture on 14th December and gonococci were isolated.

Sitz baths and rectal douches were stopped and mixed vaccine (gonostaphylococcal) 1 c.cm. (first dose) was given subcutaneously.

On 17th the patient developed endocarditis as revealed by a localized presystolic murmur. Heart was not enlarged. From now on the patient gradually got worse, became toxæmic and exhausted.

On 20th he developed intense pain in his cardiac area and auscultation revealed crepitations of pleuropericarditis; spleen became tender and enlarged; temperature high, regular quotidian intermittent type (*see* chart); and pain became generalized all over his body. There was no evidence of myocarditis.

On 22nd December gonococcal serum 22 c.cm. was given in the morning and patient placed on 'D. I' list.

At 3 p.m. patient suddenly became unconscious with coniugate deviation of eyes to the right (indicating a cerebral lesion on the left side). Pupils were dilated and insensitive. Pulse was full, 134 per minute, and respiration hurried, 40 per minute. This sudden apoplexy without any prodromal symptoms in the presence of an obvious endocarditis involving the mitral valve pointed to cerebral embolism.

On the following day he developed paralysis of the muscles of deglutition and had an unconscious evacuation of urine in bed. He remained unconscious, and died at 4-10 p.m. on 24th December, 1935.

Post mortem was performed at 9-30 a.m. the next morning.

Findings:—

Heart.—Pericardial sac contained turbid fluid (commonly associated with infections of blood stream).

Epicardium.—Patches of whitish appearance of varying sizes up to half an inch square looking more like 'soldier spots' than 'milk spots'.

Endocardium.—Warty excrescences varying in size from a pin's head to a bean present on the auricular surface of mitral cusps, a short distance from their margins and spreading on to cordæ tendinæ; musculi papillaris swollen and inflamed: no extension over mural endocardium or intima of aorta; vegetations of crumbling type: aortic cusps normal in appearance.

Lungs.—Crepitant and floated in water.

Left lung.—One abscess at the cardio-pleural junction, apparently the cause of the pain which patient complained on 20th December, over which crepitations were heard on auscultation. There were two more abscesses in the lower lobe (posterior aspect). The abscesses were surrounded by an area of secondary inflammation. Smear of pus from the abscess at the pleuro-cardiac junction showed Gram-negative diplococci resembling gonococci.

Liver.—Slight increase in size. On section it was found to be in the advanced stage of cloudy swelling that is seen in septicæmia and ulcerative endocarditis. The substance of the liver was soft and its tissue yellowish. No areas of necrosis discernible to the naked eye.

Spleen.—Swollen and soft in consistence. On section it had a pinkish creamy colour with white infarction present in its upper half.

Kidneys.—Appeared normal.

My excuse for publishing this case is its comparative rarity, its failure to respond to routine treatment, and the regular march of complications from posterior urethritis to cerebral embolism. The failure to respond to treatment may have been partly due to the syphilitic infection which the man had apparently contracted concurrently with the gonorrhœa.

MALIGNANT DISEASE OF THE PROSTATE IN A SMALL CHILD

By RAI BAHADUR HUKAM CHAND GUPTA
F.R.C.S. (Edin.)

Civil Surgeon, Mardan, Peshawar, North-West Frontier Province

A MALE child, about 3 years of age, was admitted into the Lady Reading Hospital, Peshawar, on the 16th September, 1936, with difficulty in micturition, which had existed for 15 days. There was no history of any trouble previously. The child was well developed for his age but looked rather pulled down and had a temperature slightly above normal. Stone in the bladder was suspected so he was to be prepared for operation.

On the 18th September he was anæsthetized; his bladder was sounded; no stone was felt but only a peculiar rough, feel of the bladder wall. As there was a very definite history of painful micturition, the bladder was opened suprapubically. A hard nodular growth was felt around the internal urethra. The prostate was also felt through the bladder to be enlarged. The growth was very hard and a few of the nodules were scraped out for examination. The bladder was drained suprapubically and the wound closed.

The prostate was very enlarged and hard when felt per rectum. There was no hæmaturia. A provisional diagnosis of sarcoma of the prostate with involvement of the bladder was made, awaiting confirmation from the laboratory.

The nodules that had been removed were sent to the Provincial Laboratory for report. Lieutenant-Colonel W. E. R. Dimond, I.M.S., kindly examined the material and reported it to be a case of early malignancy.

The wound healed perfectly but had to be kept open for purposes of micturition as no urine was passed per urethram. The child was discharged from the hospital a month after.

I have since learnt the child died one month after discharge from the hospital and no post mortem was done owing to the difficulty of obtaining permission from the parents.

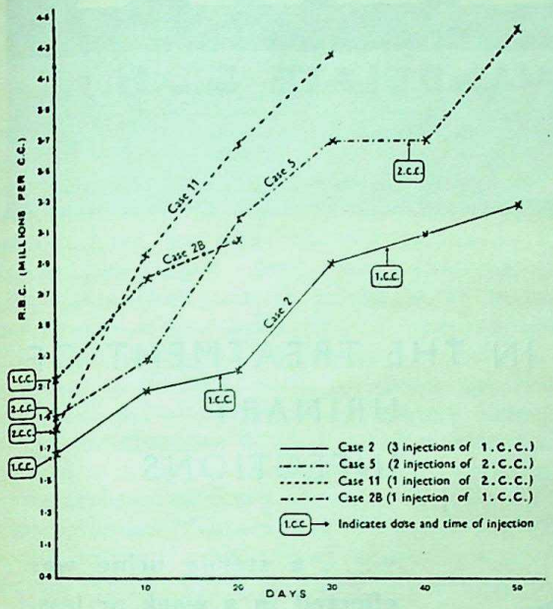
This case is of interest on account of the rarity of such a condition in so young a child.

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Indian Medical Gazette

MARCH

DIET AND ADAPTATION TO THE TROPICS

THE problem of the adaptation of man to the climatic conditions of the tropics is a wide one. Its study is of interest not only to those in tropical countries but also to others in the temperate zone, for the real significance of one's surroundings in any climate is never fully appreciated until they are changed. The adaptation that man is called on to make in the tropics is primarily one of heat regulation. This physiological adjustment includes a number of factors, such as dwellings, clothes and food, all of which are intimately concerned in the maintenance of that peculiar mammalian feature, namely, a constant body temperature characteristic of each species, and we do not know whether Nature has provided anywhere in the tropics the ideal local conditions necessary for the maintenance of this body temperature. As regards housing and clothing for instance, man himself can do much in the way of adaptation. Food however is in a somewhat different category. Nature provides a varied dietary which man according to his tastes and customs takes or rejects, but we are not yet clear as to what is the optimal or ideal to be aimed at in order to effect a suitable adjustment to the climate.

The problem of diet however cannot really be divorced from that of heat regulation and body temperature. At the present time nutritional studies in this country are concentrating on the adjustment of diet to disease and its prevention. The calories for the time being are in abeyance, yet this is an aspect that should and would receive due attention were there no evidences of nutritional disease to overshadow it.

Man and indeed each mammal species have set themselves at a constant body temperature somewhere in the region of 100 degrees Fahrenheit, whether they live at the poles or the equator. In general, this temperature is maintained by a more-or-less constant, basal metabolism, aided by a physical mechanism which regulates heat loss by conduction and evaporation of water. *A priori* one would have expected that Nature, were body temperature of prime importance, might have endowed man with the capacity for lowering his basal metabolism under certain conditions. It is not so, however, for it appears that adjustment of body temperature has been effected largely by extrinsic factors, such as housing, punkas, clothes and diminished food intake. Nature appears to demand that we keep up a body temperature of 98 and a basal metabolism of about 39 calories per hour per metre in whatever latitude we may find ourselves. To ask 'why' is hardly a justifiable question; science is concerned only with the 'how'. Some years ago, at a meeting of physiologists in the United States of America, it was suggested that all the mammals had met in the garden of Eden and had decided after discussion to set their temperature and metabolism at that level. In such a flippant manner does the scientific mind react when confronted with a 'why'. Barcroft, however, has pointed out in his *Features in the Architecture of Physiological Function of the Living Body* that the constant temperature and composition of the blood is really an essential condition for the normal functioning of one activity—namely, consciousness. Lower the temperature or the oxygen of the blood beyond a certain point and consciousness is the first to suffer.

The problem however of the suitability or otherwise of a tropical food to the tropical climate is not so easily solved nor are we given so obvious a lead as is the case with housing and clothing. Nature offers fat and protein at the poles and carbohydrates at the equator, and willy-nilly man has accepted what has been given to him. Buckle, in the middle of last century, in *History of Civilization* gives an interesting comment on the significance of fat in the arctic regions. As is well known, fat has a higher caloric value than the other foodstuffs and requires a greater amount of oxygen to oxidize a given weight compared with carbohydrate. At the poles he points out that each breath of inspired air (at the temperature prevailing) carries more oxygen than a corresponding volume of air in the tropics and hence a greater amount of fat can be oxidized. This explanation is perhaps hardly relevant, but the attitude of mind is prophetic of the modern work of L. G. Henderson who has done so much to show the fitness of the environment in relation to the needs of the organism.

The heat-stimulating effect of protein—its specific dynamic action—is one which does appear to play a part in the adjustment of diet to climate. The Eskimos often consume large quantities of meat, sufficient to raise their metabolism over 50 per cent, an obviously practical advantage. In the tropics, on the other hand, a low-protein vegetarian diet is hence from this point of view advisable. A low-fat diet is also a feature of the tropical dietary and within limits probably advantageous. On account of the low-protein diet and a climate making extreme physical work almost impossible, a large calorie intake is never required; in other words one's calories can be supplied without undue bulk in the form mostly of carbohydrates. In the colder parts of the

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world where harder physical work can be and often is performed, the calorie intake of a Canadian lumberman for instance, which may be 9,000, could not be consumed as starch without putting too much strain on the demands of the alimentary canal. Such a diet would be almost impossible were it not that fat is very much less bulky than cereal foods, etc. The tropics do not demand an unduly large layer of body fat externally or internally, hence there is a further diminished demand for fat.

Carbohydrates, however, have a definite effect on the physiological mechanism of the body, which seems to be of considerable importance. Numerous workers (Zuntz, Bridges, Puckett and Wiley) have noted that a change from a fat to a starch diet involves a considerable retention of water and *vice versa*. Some of this is taken up by the stored glycogen and some as extra fluid in the extracellular, and probably intracellular, fluids. In other words on a carbohydrate diet there is an increased reservoir of water for evaporation and urine secretion if necessary. Moreover, carbohydrates are always the first to be metabolized and hence *pari passu* more mobile fluid is available while it is being burnt. Further, experiments by Burr and others on rats on a fat-free diet have shown that those animals consume more water and excrete actually less urine than others with fat in their diet. More fluid appears to be eliminated by the skin and lungs. It may be a small point but pulmonary ventilation is greater when carbohydrate rather than fat is being burnt, owing to a larger output of CO_2 per calorie of heat. This would increase the heat loss by evaporation of water by the lungs.

These experiments are suggestive in the light of the observations of Eijkman in 1924 on Europeans and Malayans in Java. He noted that the Malayan is much more economical (physiologically) in his water elimination than the European. Under identical conditions a European lost 143 grammes of water and a Malayan only 105 grammes by insensible perspiration in a given period. Contrary to expectation, the Malayan had also the smaller volume of urine, even though he had received extra water, while the European had been deprived of it during the observation. The European appears to waste water as liquid perspiration which hence does not perform its physiological function—namely, evaporation and heat loss. It is then a problem how much of this adaptation is racial and how much is due to a carbohydrate diet conserving the body fluids. The increased urine elimination of the European may have been due to the greater quantity of nitrogenous products, which would be much less in the Malayan consuming a low-protein diet. The Malayan on the other hand may consume more salt, which, under certain circumstances, promotes retention of water.

Such then are some of the ways in which Nature may have been more beneficent to those at the equator than one thinks. One does not wish to make out an apologia for the time-honoured dietary of thousands of years which nevertheless does seem to lack certain essentials necessary for health. Yet it should be said that it points to the necessity for due caution in laying down nutritional standards which are merely carried over from a temperate zone. Man is an adaptable animal, and, if a healthy body fabric is to be woven, let the warp be made from scientific principles and the woof from the customs and habits of the peoples in whatever region of the world they may be situated.

H. E. C. W.

Special Articles

THE EPIDEMIOLOGY OF LEPROSY*

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1. *Introduction*

IN this paper I attempt to outline in a general way some of the chief facts and theories regarding the epidemiology of leprosy. I am, however, not an epidemiologist, and also knowledge of this aspect of leprosy is not very extensive or accurate.

Epidemiological studies of leprosy are handicapped because statistics collected by health authorities, census officers, etc., are so inaccurate as often to be very misleading, and also because we have no test which indicates with any accuracy susceptibility or immunity to leprosy. The leprosy worker has to collect his own information and statistics by direct observation of the disease in the peoples affected.

The epidemiological study of any disease involves a study of its history. Leprosy is a disease which is constantly referred to in literature from the most ancient times to the present day, and from a study of these records classical scholars have tried to piece together a history of the disease. The following is an outline of this history based largely on that given in Rogers and Muir's *Leprosy*.

* A paper read at the Public Health Society, Calcutta, 22nd January, 1937.

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2. *Outline of the history of leprosy*

This outline is of doubtful accuracy. The disease possibly originated in Africa. In prehistoric times it spread to India and Egypt and a very early reference to it is in the Vedas dated about 1400 B.C. In the Eber's papyrus about 1550 B.C. there are descriptions of skin diseases under the names 'Uchedu', 'Chon's swellings' and 'Anut of Chon's swellings', the symptoms of which correspond very closely to those of leprosy. There is a questionable reference to it in the Egyptian records of 1350 B.C. in the reign of Rameses II. Munro reads the records as indicating the presence of leprosy in Negro slaves brought from the Sudan. Whether this reading is accurate or not, there is no doubt that in ancient as well as modern times invasions and the slave trade have been important factors in the spread of leprosy from one country to another.

Thus in very ancient times leprosy was common in Central Africa, India and possibly Egypt and in these areas it is common to this day.

From India leprosy spread eastwards. The oldest Chinese medical writings give no definite indication of its presence, but in the writings of about 100 to 200 B.C. there are definite references to leprosy.

From Egypt the disease spread round the eastern Mediterranean. The Jewish writings of the Bible contain many references to a disease '*Zaraath*', which is described in some places in the Bible as being highly contagious, producing patches white as snow, and being fairly readily curable. Other references in the Bible indicate the incurability of leprosy. Possibly under the one term '*Zaraath*' are included many skin diseases, such as psoriasis and leucoderma, as well as leprosy.

In 150 B.C. when the Jewish writings were translated into Greek, the word *Zaraath* was translated into the Greek term 'lepra' which is used in the Hippocratic writings for a scaly disease. It is probable that in the Hippocratic era there was no true leprosy in Greece for Hippocrates described no such disease, but Aristotle about 345 B.C. has references to the disease which may, therefore, have been found only in Asia Minor. Factors which may well have contributed to the spread of leprosy were the conquest of Egypt by Cambyses, 525 B.C., the conquests of Darius in the same century and later in 480 B.C. the conquests of Xerxes. According to Herodotus, Xerxes led 6,000,000 people from Asia into Europe, many thousands of whom remained in Europe. When true leprosy appeared in Greece the term 'lepra' was not applied to it but the term elephantiasis was used. The use of the word 'lepra' for what we now know as leprosy probably originated in a mistake in translation. In early medical writings in Arabic the term 'djudsum' is used for leprosy, and when these writings were translated into Greek by Constantine of Carthage in the tenth century, the word 'lepra' was wrongly used, but the name has stuck. The Greek term for leprosy, elephantiasis, is still used in some medical writings and in Calcutta when the diagnosis has to be written without the patients or others knowing the initials E.G. (Elephantiasis Graecorum) are often used.

Leprosy was unrecorded in Roman writings until the time of Pompey, when it is recorded as having occurred in the soldiers returning from the East in 62 B.C. In Roman history from then onwards leprosy is often referred to. The Romans introduced leprosy into other parts of Europe. Galen wrote of it in Germany in A.D. 180 and Virchow reports that by A.D. 600 there were hundreds of leper houses in Italy and Germany. In the fifth and sixth centuries Spain was infected by Roman troops. After the fall of Rome, the conquest of Alaric and others probably helped to spread the disease. From Spain leprosy spread to France. (The Saracens invaded France from Spain early in the eighth century.) In 1757 laws were passed prohibiting the marriage of lepers and decreeing divorce of lepers.

Leprosy was probably introduced into England by the Romans. Sir G. Newman records that the first leper house in England was founded in Nottingham in the seventh century. The following are the dates of the establishment of the first leper houses :—Ireland 869, Wales 950, Scotland 1177 or 1300 (Newman). Meanwhile Norway was infected in 1266 and Shetlands, Faroe, Iceland, Greenland, Holland, Denmark, Sweden, Russia, the Baltic countries had also been infected.

Leprosy reached its height in Western Europe about 1200 though it was very common from A.D. 1000 to 1400 (2,000 leper houses in France alone). The influence of the Crusades on the incidence and the spread of leprosy has been discussed, but Newman thought that they only affected leprosy by impoverishing western Europe.

So far the story has been one of the introduction of leprosy into previously unaffected countries, and of its spread in such countries. In the thirteenth century, however, leprosy began to decline in Western Europe and by the seventeenth century it had more or less died out in this area excepting in a few persistent foci. The 'epidemic' in Europe had lasted about one thousand years.

The reasons for the dying out of leprosy in Western Europe have been discussed at great length by various writers, but no really satisfactory explanation has been given. Some students of the subject have considered that the isolation carried out in 'leper houses' was responsible (there were thousands of such institutions in medieval Europe). Climate and meteorological changes have recently been quoted as

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important factors. Improved social and hygienic conditions and diet have been cited. A few writers have suggested that the Western European races gradually became immune because of the gradual dying out of the stock which was susceptible to leprosy. Other writers have considered that the tremendous mortality associated with the great plagues of the Middle Ages was an important factor. Some of these factors are discussed later. Other writers think that the reasons for the decline of leprosy in Europe are undetermined and possibly undeterminable, and quote similar phenomena seen in other diseases, such as tuberculosis and plague, such diseases dying out gradually or suddenly with no apparent cause, sometimes when conditions appear to be most favourable for their spread. One striking example of this is the steady decline in tuberculosis in England which began about 1800 just when the industrial revolution created conditions apparently favourable to its spread. This decline started long before the establishment of any organized anti-tuberculosis work.

I think we must admit that we have no satisfactory explanation of the decline of leprosy in Europe.

While leprosy was declining in Europe it was being conveyed to other previously uninfected countries: to North America and the West Indies by immigrants from Europe and by slaves from Africa, and to South America by immigrants from Spain. In South America leprosy is still widespread, but in North America there are only a few foci of leprosy.

Even within the last half century leprosy has been introduced into previously uninfected countries, chiefly Pacific Islands. The story of leprosy in Nauru is well known to students of leprosy. Leprosy was introduced and for some years spread very little. After the influenza epidemic of 1918 however (in which an incidence of 100 per cent and a mortality rate of 30 per cent were seen) leprosy spread widely and in a few years about 20 per cent of the population was affected, the disease, however, being in a comparatively mild form. The epidemic was short-lived and is now on the decline.

The history of leprosy is, on the whole, a history of endemicity of the disease in some parts of the world for thousands of years with its introduction from time to time into other parts where it may be seen in the form of very long period epidemics, dying out in time for no apparent reason.

3. *Transmission of leprosy*

This matter can only be discussed very briefly here. The only mode of transmission of leprosy about which there is any certainty is transmission by direct contact with infectious cases. Even so we do not know the exact way in which the bacilli get into the body, but most workers consider that it is probably through abraded skin or through mucous membrane.

Transmission by contact with infected articles may be seen occasionally. It is extremely doubtful if the disease can be conveyed by infected air, water or food. Insect transmission appears on the whole to be improbable.

4. *The present distribution of leprosy in the world*

Leprosy is now regarded as a tropical disease and it is found chiefly in tropical countries but it still exists to a considerable extent in some non-tropical countries and, as will be clear from the history of leprosy which I have given, it used to be very prevalent in many non-tropical countries. The present distribution of leprosy in the world is shown roughly in the accompanying map I. Light shading indicates presence of leprosy but in small amount, less than 1 per mille. The more heavy shading indicates a moderate incidence of leprosy, probably between 1 and 2.5 per mille. The black portion indicates an incidence of leprosy of more than 2.5 per mille. In the black areas the incidence is usually from 5 to 10 per mille but in some areas, such as portions of Central Africa, the incidence may rise as high as 50 per mille. The map shows that the chief foci of leprosy are Africa, India, China and South America, that the heavily affected areas are nearly all in the tropics but that leprosy is found sometimes a long way from the tropics and even inside the Arctic circle, for example, Greenland, Iceland, Norway, the Baltic countries and Canada.

5. *Distribution of leprosy in India*

This is shown roughly in the accompanying map II. It will be seen that the areas with a high incidence are in the east and south, that central and western India and the Himalayan areas show a moderate incidence while the north-west of India is relatively free from leprosy. The most heavily affected areas are probably West Bengal, South Bihar, Orissa and Madras.

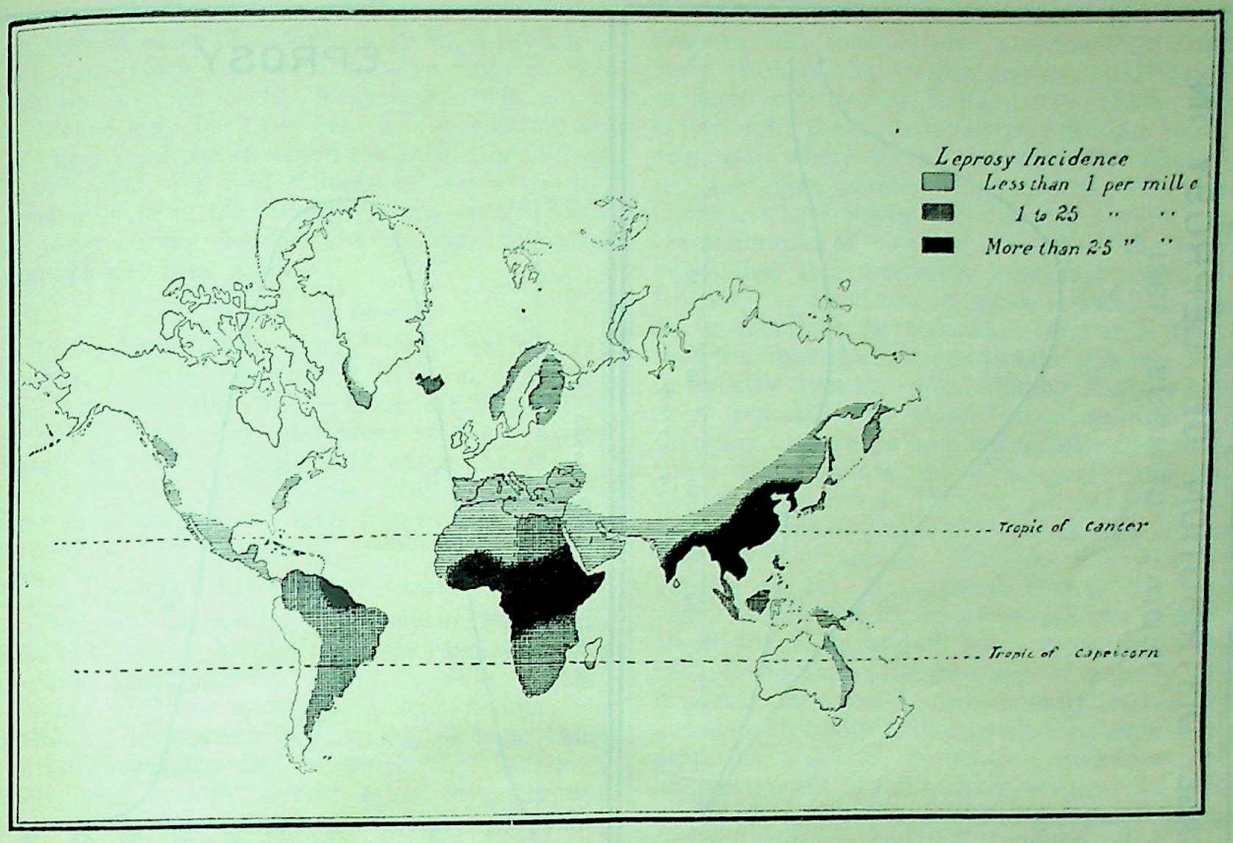
6. *Incidence*

Until about 10 years ago the only information regarding incidence of leprosy in India as a whole was that available in the decennial census, which in 1921 reported a total number of 102,000 cases of leprosy, giving an incidence of .35 per mille. The highest incidence reported in any area was about 1 per mille. During the last 10 years much leprosy survey work has been done in various parts of India and it is found that the census figure for many areas needs to be multiplied by a factor which varies between 3 and 20 and averages about 8. The census return for 1931 shows a figure of 147,911, an increase on the 1921 figure of 45,398. This increase possibly does not represent a real increase of leprosy but only an increase in the accuracy of the return. On the basis of our survey findings we have concluded that the

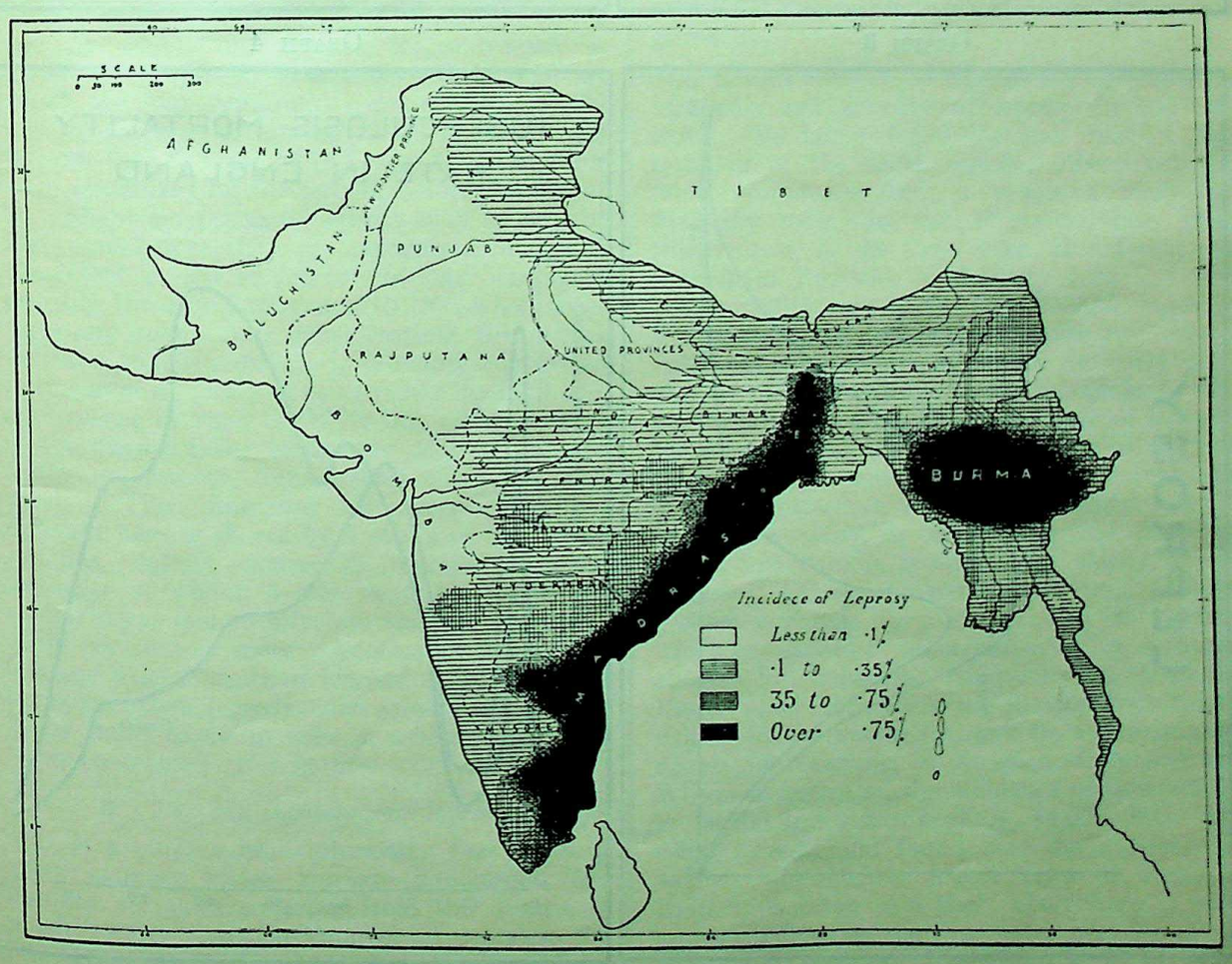
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MAP 1



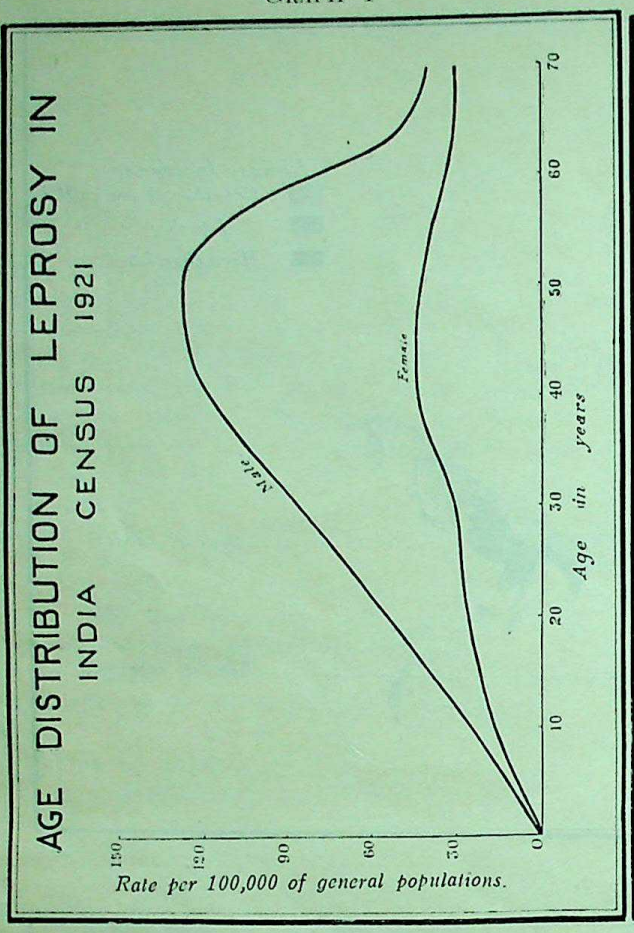
MAP 2



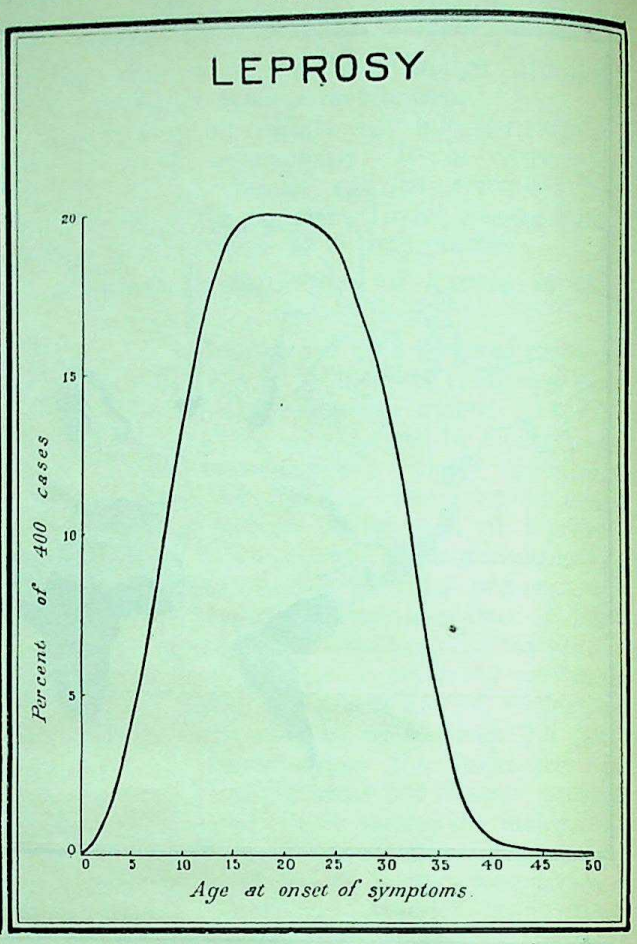
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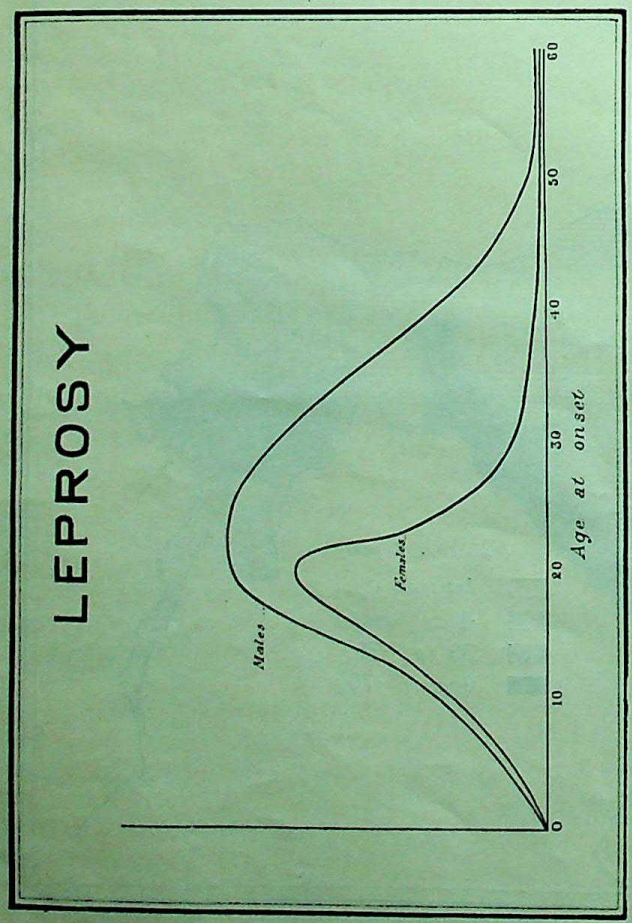
GRAPH 1



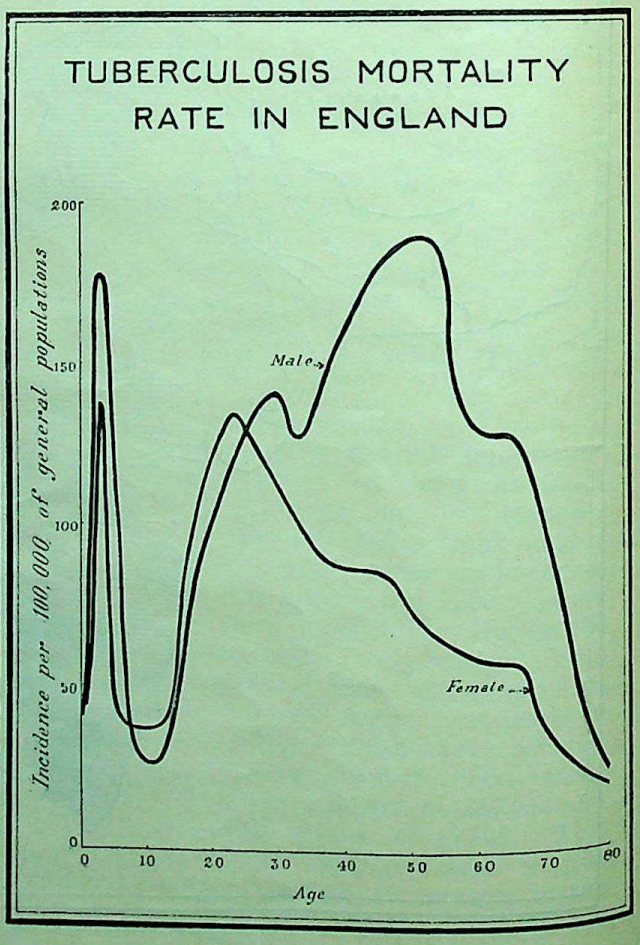
GRAPH 2



GRAPH 3



GRAPH 4



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number of cases of leprosy in India is probably not less than one million. We find, in the heavily infected parts, large areas where the incidence may be 2 per cent of the population. We find small areas where the incidence is 5 or 7 per cent. We find villages in which the incidence is 15 or 20 per cent. It is on the basis of these survey figures that the accompanying map II has been made.

7. *Types of leprosy*

These high figures should however be explained a little. In survey work in India we find that on the whole there are about two relatively mild cases of leprosy to every severe case. In some of these mild cases, the disease is of little clinical or public health importance and in quoting these high figures these facts should be borne in mind.

8. *The age distribution of cases of leprosy*

The age distribution of cases of leprosy in India reported in the 1921 census is shown in the accompanying graph 1. The highest number of cases is found in the middle age periods. This graph is, however, of little value in indicating the age in which the disease is contracted because leprosy is a very chronic, often non-fatal, disease which exists for many years, and a middle aged or old person suffering from leprosy may often have contracted the disease quite early in life. An indication of the age at which the disease is contracted is given in graph 2 which gives the age at which the first symptoms were noticed, in 400 unselected cases of leprosy of all ages. It will be seen that in most of the cases the symptoms were recognized by the patient before the age of 30. Slight symptoms of leprosy may be present for years before they are recognized, and also the latent period of leprosy is long, averaging possibly three or four years, so that when these facts are taken into consideration, this graph indicates that the disease is probably contracted in the great majority of cases either in childhood, adolescence or early in adult life. The chances of the disease being contracted after the age of thirty are remote, though such cases are seen rarely. The difference in susceptibility at different ages is shown by a study of leprosy in families. Adults exposed to infection show an incidence of about 5 per cent, while children similarly exposed to infection show an incidence of 50 per cent or more. Another finding which is made from a study of leprosy at different age periods is that leprosy contracted early in life is far more likely to take a serious form than when contracted later in life.

9. *The sex incidence of leprosy*

It is a curious and interesting fact that in every country where leprosy is common the number of males suffering from the disease is much greater than the number of females, the proportion averaging about 2 to 1. It may be thought that these returns are due to the difficulty of examining women properly, particularly in such countries as India, but I think there is no doubt that this is not so. Similar returns are made where there is no difficulty whatever in examining women. For example, in New Guinea, where males and females always wear the minimum of clothing and where the whole population is periodically examined naked for leprosy, the incidence in males is twice as high as in females. In the same area it is found that the disease also tends to take a milder form in females than in males. Similar findings have been reported in many other countries. It therefore appears to be quite definite that males suffer from leprosy more commonly and probably more severely than do females.

It is interesting to study the sex incidence at different age periods. This has been done in various centres. It is found that in the early years of life the incidence in the two sexes is about the same and in some countries it has been found that after the age of puberty the incidence in females may actually exceed the incidence in males. Shortly after puberty, however, the incidence in females reaches a peak and then tends to fall quickly, while at the same period the incidence in males continues to rise for several years and then falls but much more slowly. A graph of the sex incidence of leprosy at different age periods has the form shown (*see* graph 3).

It is very difficult to explain the difference in incidence and severity of leprosy in the two sexes. We might for a moment consider the question of the sister disease, tuberculosis. I have reproduced here a graph 4 made by McNalty indicating the mortality rate from tuberculosis, of the two sexes at different age periods in England. (McNalty considers that the mortality rate is the most reliable index of the incidence of tuberculosis in the two sexes.) In general outline (if we ignore the early peak due to infant mortality from tuberculosis) the curves are somewhat similar to those of leprosy, the incidence of tuberculosis in females is lower than that of males at all ages except the age of adolescence and the mortality rate is also lower. Now in tuberculosis this difference in sex incidence is probably due chiefly, if not entirely, to environmental factors, namely, greater exposure to infection and to factors which predispose to tuberculosis. This is caused chiefly by industrial conditions in England. Under other conditions the incidence of tuberculosis in the two sexes may be approximately equal; for example, in America, Robinson and Wilson investigated the incidence of tuberculosis in 20,000 industrial workers, 14,000 men and 6,000 women, and found that the incidence in women was slightly higher than in men. In India it is often said that tuberculosis is commoner in females than in males because of the unhealthy condition of seclusion in which many

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women live. Therefore the reason for the difference in the sex incidence of tuberculosis is probably environmental. In leprosy, however, it is difficult or impossible to explain the lower incidence in women on this basis. Even in countries where men and women are equally exposed to infection the incidence in women is much lower.

It is a well-recognized fact that women are less susceptible to some diseases than men, but in no disease does this appear to be so marked as in leprosy. An interesting discussion on the sex incidence of the disease in general is given by Stallybrass in his book on epidemiology. I have made the following summary of this discussion :—

There are differences, sometimes quite marked, in the incidence and mortality of infectious diseases in the two sexes. Some diseases (*e.g.*, whooping cough and acute rheumatism) are reported as being more common in females, while others (*e.g.*, pneumonia and the middle-age form of tuberculosis) are more common in males. It is also noticeable that the sex incidence of disease often varies with age.

Nevertheless, at all age periods males show a greater incidence of infectious disease and a higher total mortality rate. This difference may be due to greater exposure or to greater susceptibility. Greater exposure may possibly explain the greater mortality in males in adult life, but it is difficult to see how it can explain greater mortality in childhood. Greater susceptibility in males may possibly be caused by sex differences; males are bigger and have a more developed musculature, which may throw a greater strain on the circulatory and excretory systems and so reduce chances of recovery when attacked. Again it is difficult to understand how this can explain the greater mortality in males in childhood.

The sex factor may be physiological rather than anatomical. The sex hormones are connected with differences in endocrine activity, as shown by the greater activity of the thyroid in women. The endocrine system is intimately connected with destruction of bacteria and their toxins. It is possible that differences in endocrine function in the two sexes may have an influence on the susceptibility to infectious diseases.

In addition to anatomical and physiological differences in the sexes there is the cytological difference. Each cell in the female contains a group of chromomeres different from the corresponding group present in the male, and it is this group that determines sex and sex differences.

Whether these anatomical, physiological, and cytological differences between the sexes have any effect on the sex incidence of disease is uncertain.

To summarize the findings regarding the incidence of leprosy in India, we find that the incidence probably averages about 3 per mille but in some areas it is as high as 20 per mille, that about two-thirds of cases are relatively mild, that the disease is usually contracted in childhood or adolescence and that males suffer from the disease more commonly than females and tend to show a severer form of the disease.

10. *Race and leprosy*

It has been suggested that the subsidence of leprosy in certain countries is due to the development of racial immunity due to a gradual dying out of the stock of the race which was susceptible to leprosy. This has been quoted as a possible reason why leprosy died out in Western Europe. Western European races have, however, at the present day no marked racial immunity to leprosy, since cases of leprosy occurring in such persons who go to countries where leprosy is endemic are not uncommon, and this is found in spite of the fact that such persons do not usually go to such countries until the age of the greatest susceptibility has passed. In India, for example, leprosy in Englishmen coming to the country in adult life is not so rare as one might imagine, and when such persons do develop leprosy the disease on the whole appears to take a rather severe form which would not indicate the presence of any marked immunity. It would appear that all races are susceptible to leprosy but there may be minor degrees of natural immunity. It is certainly true that leprosy shows itself rather differently in people of different races. In the Far East, the Philippines, Japan and Siam, for example, the disease appears on the whole to be more severe than it is in India, and also certain clinical manifestations of the disease which may be attributed to the relatively high resistance of Indians to leprosy are much more rarely seen in these Far Eastern countries. These differences may possibly be attributed to climatic and other factors but in countries such as Malaya or the West Indies where the population consists of different races—Chinese, Indian and Malayan, or Indian and African—leprosy appears to show itself in forms varying somewhat according to the race of the affected person. Here climatic and other differences are largely eliminated. It does appear, therefore, that there are some grounds for believing that there are minor degrees of racial immunity to leprosy. Regarding the nature of this immunity I cannot say anything here. The question has been raised as to whether racial immunity to leprosy may partly explain the distribution of leprosy in India. Do the races of the north-west suffer much less from leprosy because they have more racial immunity than the people of the south and east ? This is a question which it is impossible to answer. However we find that leprosy is quite common among Punjabis and others who

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have migrated to endemic areas such as Bengal, and when it occurs it may take a severe form.

11. *Climate and leprosy*

Climate affects leprosy in two ways. First of all it may affect the transmission of the disease and secondly it may influence the course of the disease. It is certainly noticeable that leprosy is most common in hot humid climates and it is possible that the humidity is of more importance than the temperature. A study of the maps of India and of the world which I have shown indicates how in dry parts, even in the tropics, leprosy is usually uncommon, whereas in moist parts of tropical and non-tropical countries leprosy may be more common. The reasons for this are not clear. One curious thing is that in some countries, where there is a considerable number of imported cases of leprosy, many of them infectious and few of them isolated, examples of such cases infecting others are extremely rare. For example, in England there are probably about 100 cases of leprosy, many of them infectious and many not isolated, but contact cases are extremely rare. The same thing is found in New York city. Climate may also have an effect on the disease and the experience of some physicians who have dealt with leprosy in tropical and in cold countries indicates that a cold country is not favourable for the treatment of leprosy. Thus the climate of countries such as England apparently does not favour transmission of the disease, but it does favour the development of the disease when it has risen.

12. *Diet*

There has, for centuries, been a common idea throughout the world that leprosy is influenced by diet. One of the common ideas in most countries, particularly in India, is that leprosy is connected with the eating of fish. Sir Jonathan Hutchinson took up this idea and gave it as an explanation as to why leprosy was so common in Europe in the Middle Ages when the eating of dried fish was very common, and why a high incidence of leprosy persisted so long among the fisher folk of Norway. Later he modified the idea and said that leprosy was due to eating decomposed fish and other bad food. This idea has now practically no adherents, for leprosy has been found to be common among people who never eat fish. It is, however, noticeable that leprosy does appear to be commoner among those peoples whose diet is ill-balanced. In China, for instance, the disease is much more common in parts where rice forms a staple part of the diet, and where protein, fat and vitamins are little taken. The same is true of India, leprosy being common among the rice-eating people of Bengal, Bihar, Orissa and Madras and less common among the people whose staple diet consists of wheat, *jawar* and other grains richer in protein. Leprosy is also less common among those peoples in India who take milk or milk products. Similar findings have been made with regard to leprosy and diet in Africa. These things may however be pure coincidence. The difference in the incidence of leprosy in the different parts of India may be explainable on the grounds of racial, climatic and other differences and not of difference of diet. There is no doubt that a good diet is an important thing in the prevention of leprosy and in the treatment of leprosy, but the treatment of leprosy along dietetic lines only has, on the whole, given disappointing results.

13. *Social and hygienic conditions*

There is considerable evidence to show that the incidence of leprosy is markedly affected by social and hygienic conditions and that leprosy tends to die out when conditions are good. The improvement in social and hygienic conditions and diet is given by some as one of the reasons why leprosy died out in Western Europe, but the evidence to show that such very marked improvement occurred between the thirteenth and sixteenth centuries, the period during which leprosy died out, is not very strong.

It is interesting to compare the incidence of leprosy in people in the same country in different stages of civilization. In India, for example, leprosy up to the present has not been common among the aboriginals and semi-aboriginals who live on the whole a healthy out-door life in very small settlements and who, although they are extremely poor, not being vegetarians, often take a much more balanced diet than many other people of India. Also when cases of leprosy occur among them they are commonly ostracized and may be driven out of the community. Thus under primitive conditions in India leprosy is not common. The peoples in India who suffer most from leprosy are the outcastes, the low-caste Hindus and the poorer Mohammedans. I need not here discuss the social and economic conditions which are usually found in the poorer parts of an Indian village, and there seems to be no doubt that these conditions combined with a poor diet and chronic ill nourishment together with the effects of such infections as malaria, chronic dysentery and hookworm have an influence on the incidence of leprosy. We should not, however, imagine that leprosy in India is confined to the lower castes. In the higher castes and among people who have better social and hygienic conditions and who live in better houses and take better diet, the disease is certainly less common, but the disease is actually found in all classes of society in India, from the very highest to the lowest. Cases of leprous servants infecting others living under good social conditions are far from rare, and it appears that even under the best conditions in India the presence of infectious cases is a very definite menace to healthy people, particularly young people and children.

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If we try to correlate the incidence of leprosy in different parts of India with the general, social and economic conditions of the people we find it is not always easy. One of the poorest parts of India is undoubtedly West Bengal and here the incidence of leprosy is high, but it is certainly no higher than it is in some parts of Madras where on the whole the social and economic condition of the people is very much better.

The social and economic conditions of the people are of course intimately connected with diet, and many people do not take a better diet because they cannot afford it. However, a more wise use of the limited economic resources of a family would often improve the diet considerably, and a reduced consumption of carbohydrates and increased consumption of protein, fat and vitamin might render the people less susceptible to infectious diseases such as leprosy.

I think there is no doubt that in India there are two special factors which have an important bearing on the prevalence of leprosy. The first of these is religious sentiment which regards leprosy not as an infectious disease but as a visitation of the gods, a man's fate which cannot be avoided.

Religious sentiment also encourages the giving of alms to beggars, particularly lepers, as a religious duty. This fact encourages the wanderings of enormous numbers of lepers all over India, particularly to centres of religious pilgrimage, and because of this sentiment it is impossible to prevent lepers travelling on trains and public vehicles all over India, usually without any payment.

The second factor is the 'joint-family system' under which a father and mother and all the married sons and their families and all unmarried children share one household. If any member of the family gets leprosy in an infectious form, all the other members of the large joint family are exposed to the infection in the joint-family house, and numbers of them, chiefly children, frequently contract the disease in this way from relatives.

14. *Leprosy in rural and urban areas*

Leprosy has up to the present been chiefly a rural problem since most of the people in India are agricultural workers living in villages. During recent years the opening up of previously secluded areas by the development of roads and railways, and the establishment of large industrial areas with large numbers of workers recruited from rural areas, have introduced a new aspect of the problem. Healthy workers from rural areas are migrating to industrial centres with their families, there getting infected with leprosy and later returning and spreading the disease in previously unaffected villages.

(*Continued at foot of next column*)

ALLERGY

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IN 1906 Wolff-Eisner suggested that human hypersensitiveness, as seen in hay fever, was related to the phenomenon of anaphylaxis in animals. Meltzer (1910) pointed out the similarity between the bronchial constriction in asthma and that seen in guinea-pigs dying of anaphylactic shock. He concluded that true bronchial asthma was anaphylactic in origin. After these observations all the clinical manifestations of idiosyncrasy were considered as anaphylactic. It was, however, gradually recognized that hypersensitiveness in human beings differed in many important aspects from the anaphylaxis as seen in lower animals. Various terms and classifications have been introduced to cover these differences. Von Pirquet (1911) after studying serum sickness coined the term *allergy* (from εργον energy and αλλος altered) meaning changed reactivity. He introduced the term allergy to indicate an altered reaction in man to foreign proteins and implied that an antigen-antibody reaction was its basis in general. Later on, Doerr extended the meaning of the term 'allergy' to include all forms of changed reaction to foreign proteins whether any antigen reaction was present or not. The term allergy is now being generally applied to the various forms of human hypersensitiveness exclusive of anaphylaxis in lower animals. Allergy has, thus, now come to mean 'exaggerated susceptibility to various foreign substances or physical agents that are harmless to the great majority of ordinary normal individuals'. The reaction appears after inhalation, ingestion, injection or skin contact of minute quantities of the particular substance and differs from any toxic action the substance might produce in large doses. This hypersensitiveness may be manifested at different sites in the body and these different manifestations are given different names. Thus in the respiratory tract

(*Continued from previous column*)

Conclusion

These then are some facts and some theories regarding the epidemiology of leprosy in the world and in India. There are great gaps in our knowledge and the need for further study is obvious. There are three points which are clear and although they are elementary they need emphasis. Firstly, leprosy is an infectious disease though not highly infectious, and the conditions found in most parts of India are favourable to transmission. Secondly, while most adults are partly or completely immune to leprosy children are usually susceptible. Thirdly, the most important thing in the control of leprosy is the prevention of contact between infectious cases and children.

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we have hay fever*, paroxysmal rhinitis† and asthma‡; in the skin urticaria, giant urticaria, dermatographia, dermatitis venenata and certain forms of infantile eczemas and other skin eruptions; in the gastro-intestinal tract certain forms of gastritis, enteritis, mucous colitis and cyclical vomiting§ in children; in the nervous system certain cases of migraine and epilepsy; in the joints paroxysmal hydrarthrosis and possibly rheumatoid arthritis. Bray (1931) considers certain forms of enuresis in children of allergic origin.

Nature of allergy

I do not propose to discuss the various chemical and physical theories which have been advanced from time to time to explain the ultimate cause of the reactions of anaphylaxis and allergy. The recent theory of Lewis (1927) is generally accepted to explain most of the facts. Lewis believes that the interaction of antigen and antibody in susceptible tissues brings about a liberation of the loosely-combined histamine normally present in the tissues and it is this liberated histamine which causes the ultimate effect. Dale (1929) considers such a conception to fit all known facts. Dale suggests that, although it is only the sensitized cells that react, the histamine might be liberated from the reacting cells themselves or anaphylactic injury of the cells of a large organ such as the liver might liberate histamine into the general circulation in such quantities as to produce the effects generally.

Mechanism of allergy.—A number of attempts have been made by various investigators to demonstrate by means of passive transfer the presence of sensitizing antibodies in the blood of human allergics. The attempts to transfer the passive sensitiveness to guinea-pigs was attended with doubtful success. Prausnitz and Kustner thought of using the normal human skin, in place of the guinea-pig, for applying the method of passive transfer. They succeeded in passively and locally transferring fish-sensitiveness to the skin of an individual not sensitive to fish. Coca and Grove (1925) using this method demonstrated the passively-sensitizing property of the blood of all subjects of hay fever and asthma in whom the cutaneous reaction to the antigen was positive. These investigators studied the reacting properties of these sera and concluded that the sera contained a sensitizing body which was different in various respects from the anaphylactic antibody and gave it the name of 'atopic reagin'. These reagins have not yet been demonstrated in all the forms of human hypersensitiveness and Coca and others (1931) has offered a classification of hypersensitiveness* taking this and other points into consideration. He divides human hypersensitiveness into four forms :—atopy (strange disease) in which the reagins in the blood are present and the condition is subject strictly to heredity; hypersensitiveness of infection in which the reagins have not been found—the condition results from infection and is not specially subject to heredity; contact dermatitis in which the reagins have not been demonstrated—the condition develops after contact with the excitant and is not subject to atopic hereditary influence; and ordinary serum disease with possibly an ordinary form of drug idiosyncrasy in which the reagins have not been demonstrated, —the condition develops during the course of contact with foreign proteins and is not subject to atopic hereditary influence.

The mechanism of hypersensitiveness to non-antigenic substances, such as metals, drugs and active principles of poison ivy and primrose, etc., was obscure till the recent work of Landsteiner and his co-workers. As early as in 1912 Wolff-Eisner in explaining this hypersensitiveness to non-antigens suggested the combination of the non-antigenic substance with the individual's own proteins producing a blood foreign protein which acted as an antigen. This theory was based on the investigation of Obermyer and Pick who in 1906 showed that antigenic specificity of the protein could be modified by nitration, diazotization or halogenation of the protein. The assumption of Wolff-Eisner has been justified by the work of Landsteiner and his co-workers. Landsteiner and van der Scheer (1929) showed that the steric configuration, as

* Hay fever is the term applied to paroxysmal sneezing, profuse watery discharge from the nose combined with nasal obstruction due to swelling of the mucosa, running from the eyes accompanied by severe itching of the mucous membrane of the nose, throat and palate occurring only at a certain season. The paroxysms are associated with the pollinating seasons of the trees, grasses or weeds to which the patient is hypersensitive. Outside this particular season he remains quite free from the effects.

† Paroxysmal rhinitis or spasmodic rhinorrhœa is the term applied to the condition in which the paroxysm of sneezing, nasal obstruction, running from the nose and eyes and itching, etc., are not confined to the pollinating season of any particular plant or plants but occur throughout the year whenever the patient comes in contact with the excitant. The excitants may include such substances as house or occupational dust, face and insect powders, animal emanations, powdered cereal grains, specific foods, drugs, incompletely broken up foods and toxins resulting from the bacterial action on such food, etc.

‡ It is to be clearly understood that all cases of asthma are not allergic in origin. Infection or disease of the respiratory tract (nose, throat, bronchi, bronchioles, etc.) and enlarged bronchial glands are responsible for a large number of cases of asthma amongst Indians.

§ Cyclical vomiting is a term applied to a malady amongst children characterized by lassitude, drowsiness, headache, fever, vomiting and marked muscular prostration. There is usually pain in the abdomen and constipation is generally present although in some cases there may be diarrhœa. The attacks begin at three or four years of age and continue at regular or irregular intervals up to 12 or 13 years of age.

* He uses the term hypersensitiveness in its immunologic sense and excludes its general medical sense or the sense of increased reactivity.

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well as the dominant chemical grouping, is an important factor in the specificity of the artificial antigens produced by linking a simple chemical substance of known structure to a protein. They prepared antigens by coupling the three isomeric tartaric acids (dextro, lævo and meso) with protein and the antisera prepared against these three artificial antigens which differed only in the steric configuration of the tartaric group exhibited only slight cross reactions. Goebel and Avery (1929) have further shown that when two simple carbohydrates, glucose and galactose,—which differ only in the steric configuration of a single carbon atom—are conjugated separately with the same protein, the antigens formed possess distinct specific characters. In this connection the observation of Whitfield (1921) is rather interesting as it tends to show the possibility of tissue protein to be so altered as to act as antigen. He cited cases of urticaria due to substances derived from a patient's own tissues. In his cases a blow on the skin or a fall produced a hæmatoma or ecchymosis without any breach of surface, nothing occurred for 10 days, at the end of which period there appeared a generalized, morbiliform, erythemato-urticarial eruption. The work of Manwaring and his co-workers in experimental anaphylaxis is very important in this respect. Manwaring, Hosepian, Enright and Porter (1925) produced evidence to show that canine anaphylaxis was due to chemical products explosively formed or liberated by the anaphylactic liver; these substances they called hepatic anaphylatoxin. Manwaring, Hosepian, O'Neill and Bing Moy (1925) produced further evidence of the existence of hepatic anaphylatoxins by cross-circulation, hepatic transplantation, and blood transfusion tests. Manwaring, Reeves, Bing Moy, Shumaker and Wright (1927) produced evidence to show that this hepatic anaphylatoxin must be regarded as a secondary antigen, presumably of protein nature and conceivably a denaturization product of the primary antigen explosively formed or liberated by the hypersensitive liver. Manwaring, Marino, McCleave and Boone (1927) produced further evidence to show that ' marked chemical alterations take place in specific antigens when injected into the animal body and that many of the essential immunologic adaptations are due to the resulting denaturization products (secondary antigens) rather than to the primary antigens originally injected '.

From what we have considered it is evident that in cases of allergy the offending substance or substances may be introduced into the body from outside or may be produced in the body itself. Thus, it may be inhaled as in hay fever, paroxysmal rhinitis, and pollen or dust asthma; it may be ingested as in food and drug allergy; it may be injected as in serum sickness; or it may be brought in contact with the skin or mucous membranes as in dermatitis venenata and allergic conditions due to physical agents, such as heat, cold, light and mechanical irritation*. A small group of allergic manifestations may be ascribed directly to insect bites and stings. When produced in the body the offending substances may originate in an infective process within the body, or it may owe its origin to some pathological condition of the gut. Altered tissue protein itself may act as an antigen. The secondary antigens which are produced in the body by the primary antigen as shown by Manwaring and his co-workers in dogs also come into this category. It appears that infective foci, whether of teeth, tonsils, sinuses, or bronchi, liberate a substance which circulates and sensitizes various tissues and is capable of producing symptoms in the skin, respiratory and gastro-intestinal tracts, joints, etc. In the cases secondary to some pathological condition of the gut the substance or substances in question result from the bacterial action on the protein, or the proteins are broken down in some abnormal fashion and the altered protein gains access to the circulation. In India the allergy secondary to some pathological condition of the gut is more important than any other form of allergy. This is probably due to a lowering of the defence mechanism of the liver in the tropics caused by amœbic or some other form of hepatitis. That the detoxicating and the proteopexic function of the liver is defective in cases of allergy was first shown by Barber and Oriel (1928) who found important biochemical changes in the blood and urine of allergics. Dharmendra and Napier (1935) tested the liver function by various tests in 38 cases of asthma and detected defective liver function in 34 cases by the lævulose test or the adrenalin test or by both.

Allergic diathesis.—There must be certain factors that make some individuals respond in an abnormal fashion to substances that are quite harmless to ordinary people. In other words, the potential allergic differs from the normal individual in some way. This difference or predisposition has been designated by such words as ' exudative diathesis ', ' allergic disposition ', ' allergic constitution ' and ' allergic diathesis '. This ' allergic diathesis ' cannot be explained by a single factor but there are various factors to be taken into account. Different factors predominate in the different cases or different groups of cases. We will briefly consider the important predisposing factors :

(1) Heredity. Heredity plays a most important rôle in a majority of cases. Nothing definite is so far known as to the nature of inheritance. Many writers ascribe the transmission to a special nervous build. Eppinger

* Physical allergy is the term applied to allergic manifestations like urticaria, rhinitis, asthma, etc., when brought about specifically by a physical agent such as heat, cold, light and mechanical irritation acting on skin or mucous membrane.

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and Hess consider the upsetting of balance between the vagal and the sympathetic constituents of the autonomic nervous system of primary importance. Endocrine dysfunction undoubtedly plays some part in bringing about the conditions and some writers believe glandular deficiencies to be directly or indirectly responsible for the transmission. It is difficult to say which of the two systems—the nervous or the endocrine—is of primary importance and influences the other since most of the glands are activated through the vago-sympathetic and on the other hand Burn (1933) found that the efficiency of the sympathetic nerve (that is to say, the size of response elicited by a given impulse passing down a sympathetic nerve) depends upon the amount of adrenalin in circulation in the blood. The increased permeability of the endothelial system is another factor that can be transmitted. The question of a particular biochemical make-up being inherited looks an important one. Slight changes in the physico-chemical equilibrium of the body might be expected to lead to profound changes in its reaction to different circumstances.

(2) Since the excitants reach the tissues after absorption through the skin or the mucous membranes it seems reasonable to believe that abnormal permeability is one of the most important factors in bringing about protein hypersensitiveness by increasing the rate and amount of protein absorption. Schloss and Anderson (1922) produced evidence to show the enteral absorption of unaltered or slightly altered protein in marasmic infants with gastro-intestinal disturbances. Anderson, Schloss and Myers (1925) showed that this enteral absorption took place in normal infants also but that the marasmic infants absorb much larger amounts and the absorption is continued over much larger periods than in the case of normal infants. Walzer (1927) has shown that in most persons unaltered food proteins enter the circulation in detectable amounts through the intestinal mucosa. It is quite conceivable that under altered conditions of permeability abnormal amounts of the unaltered food proteins enter the circulation. This has been actually shown to occur by Anderson, Schloss and Myers, as referred to above. O'Keefe (1927) is of opinion that there is definite and important relationship between the capillary circulation and allergic conditions, variations in capillary permeability affecting the amount and rate of protein absorption. Abnormal permeability may be an inherited factor or in the acquired cases it may be dependent on the excessive amount of histamine or allied poisons produced. Knott and Oriel (1930) have described in the sputa of asthmatics the presence of certain Gram-negative bacilli which during their growth within the small bronchial tubes give rise to histamine. Mellanby and Twort (1912) described the presence of histamine in the intestinal wall and recovered a bacillus from the alimentary canal which converted histidine into histamine. Hanke and Koessler (1922 and 1924) found that histamine was a normal constituent of the large intestine of man and that this portion of the intestine normally contained micro-organisms that have the faculty of decarboxylating histidine into histamine and tyrosine into tyramine. It is quite conceivable that abnormal conditions in the intestines give rise to abnormal amounts of histamine and allied substances which alter the permeability. O'Keefe (1927) suggests that faulty digestion resulting in irritating intestinal contents might be expected to cause a change in the capillaries of the villi of the small intestine.

(3) The biochemical aspect. Important biochemical changes in the blood and urine are found during the attacks. Hurst suggested that in asthma there is some alteration in blood chemistry which renders an asthmatic subject liable to an attack of asthma from stimuli which in a normal person would produce no response. Barber and Oriel (1928) have found that the amino-acid content of the blood is raised during acute paroxysms of allergic manifestations and the whole blood chlorides seem to be markedly diminished. They pointed out the similarity of these blood findings to those of Haden and Orr in experimental intestinal obstruction. Haden and Orr concluded that the symptoms of toxæmia were due to proteoses absorbed through the damaged intestinal mucosa and that chloride was utilized to neutralize the toxic substances. In urine also, Barber and Oriel found important changes; immediately before and during the paroxysm there is a decrease in urinary output accompanied by a deposit of urates, an increase in free acidity and ammonia and a diminution in chloride excretion. During this period the urine gives a positive ether reaction for proteoses, to which they have attached a great importance. Following the paroxysm the quantity of the urine is increased and the urine becomes less acid or even alkaline and contains an excess of chlorides.

The calcium content of the serum and specially the calcium-potassium ratio has been widely investigated. It has been demonstrated that the effect of calcium and potassium on the cell was antagonistic, whereas calcium ions decrease nerve irritability potassium ions increase it. Some workers have reported low calcium contents of the blood in allergics but most investigators found no deviation from the normal figures.

Liver dysfunction.—The experimental work of Weil (1917), Weil and Eggleston (1917), and Manwaring (1921) demonstrated that the liver was the site of the anaphylactic reaction in dogs and that shock did not occur when the liver was thrown out of the circulation. It is very probable that liver dysfunction plays an

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important part in the production of allergic symptoms in man, specially in allergy of intestinal origin. Osman (1929) suggested that in asthmatic children there is a diminution in glycogen reserve. O'Neill, Bing Moy and Manwaring (1925) found that glycogen disappears almost quantitatively from the canine liver during the first fifteen minutes of anaphylactic shock. McGuigan and Ross (1915) found a reduction of liver glycogen in peptone poisoning. It appears that the liver utilizes its glycogen to neutralize the toxins. The proteopexic function of the liver, *i.e.*, its power of fixing proteins and its derivatives, also appears to depend on an adequate supply of glycogen. In the absence of an adequate supply of glycogen in the liver, the unneutralized toxins and the proteins tend to pass the barrier of the liver and gain access to the general circulation. If this inadequate proteopexic function is combined with a- or hypochlorhydria, which makes the absorption of proteins capable of producing sensitization more likely, the chances of such a protein reaching the circulation are much increased. The detoxicating function of the liver is concerned in transforming products of protein digestion into urea and in rendering non-toxic the products of bacterial action on undigested protein. The biochemical findings in the blood and urine of allergics provide ample evidence of a basic toxic factor in these conditions. The chief source of this intoxication is the bowel and the inadequate detoxicating function of the liver allows the toxins to pass into the general circulation.

Disturbance in the acid-base equilibrium

Before leaving the question of biochemical make-up as a predisposing factor in the allergic diathesis reference must be made to the disturbance in the acid-base equilibrium towards the alkaline side which has been found in the allergics. The importance of this disturbed balance lies in the fact that it has been shown that changes towards the alkaline side increase sensitiveness in a sensitized tissue and a change towards the acid side reduces the sensitivity. Hemingway (1926) has shown that slight changes towards the alkaline side in the perfusing fluid brought about exaggerated responses in the sensitized tissue and that the addition of hydrochloric acid reduces the sensitiveness. McDowall and Thornton (1930) demonstrated the effect of slight changes in the H-ion concentration of the perfusing fluid in isolated bronchial preparations. A slight change towards the acid side causes a dilatation of the bronchiolar muscles and an opposite change towards the alkaline side brings about a constriction. In accordance with this view, efforts have been made to treat the allergic conditions by giving dilute acids or acid diets or by making the patient inhale carbon dioxide or hydrochloric acid gas in definite concentration. Intravenous injections of hydrochloric acid have also been advocated.

Diagnosis of allergy.—(1) History. In cases of suspected allergy it is essential to go carefully into the history of the patient. Well-planned and careful enquiries enable us to elicit many points of great diagnostic value. In taking the history the following points should be noted keeping the significance of each at the back of one's mind. Any additional questions that are suggested by the nature of the case should also be put to the patient :

(*a*) Age of onset. Most allergic conditions commence early in life. It is important to find out the age at which the patient first noticed the onset of the symptoms.

(*b*) A history of inheritance is commonly found in the allergic cases. It is not only the particular manifestation of allergy, say asthma, from which the patient suffers that is to be looked for in the near blood relatives, but a history of allergy in general should be sought.

(*c*) Season of onset and the seasonal variations in the disease are of importance. This may give a clue to the offending flowers, foods, etc.

(*d*) There is a regular periodicity in the early stages of the allergic conditions. When they are severe and persist for several years they tend to become continuous. The history of dyspnœa having been a continuous feature from the very beginning excludes the possibilities of a case being one of asthma.

(*e*) Association of the disease with some particular place, food, animal, or profession may be elicited. Particular attention should be paid to the surroundings at home and work, such as the presence of factories and stables near at hand, the presence of or association with pets and poultry, horses, or cows, the presence of pillow-cases stuffed with chicken feathers, etc. In this connection enquiry into any alteration in the circumstances, surroundings, diet, etc., immediately preceding the initial attacks will be of much help. The details of the early attacks, before repeated attacks introduce the secondary factor of infection, are similarly very helpful. Any factor which in the patient's opinion may be responsible for his symptoms should also be noted down. As regards food, at times the provocative article or articles of diet can be named by the patient but in the majority of cases he has to be carefully dieted before any food can be incriminated.

(*f*) The past history of the patient should be looked into. Enquiries should be made if the patient has suffered from allergic conditions, *e.g.*, urticaria, angioneurotic œdema, hay fever, and food or drug hypersensitiveness. This might help in confirming or suggesting the diagnosis of the allergic nature of the ailment for which the patient is seeking advice. A history of having suffered badly from dysentery or digestive troubles is also very suggestive. In cases of asthma infections diseases of

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the upper and lower respiratory tract should be enquired into.

(2) A total and differential blood count is made. Most allergic patients have a high blood eosinophilia.

(3) Protein skin tests are often of value in confirming the diagnosis when a careful history makes it possible to discover a specific substance responsible for the patient's symptoms. When no clue is afforded by the history at all in doing these tests we are to be guided by the fact that food is responsible for most cases of hypersensitiveness in infants and babies. As age advances, the inhalant factor becomes more and more important and in adults this is responsible for most of the cases, food hypersensitiveness being rather rare at this age. Amongst the inhalants the dust extracts made from the sweepings collected from sleeping or office rooms, factories, or any other place where the patient spends most of his time is an important one*.

These skin tests are based on the fact that those substances which, when inhaled, ingested, injected or taken into the body by any other means, are capable of producing allergic symptoms will also produce an urticarial weal when brought in contact with the lower layers of the skin.

The dermal tests are usually done on the forearm. The forearm is carefully cleansed with alcohol and scratches are made on it transverse to the long axis of the arm. The scratches are made only one-eighth of an inch in length and without drawing blood. One spare scratch is made to serve as a control. A drop of N/10 sodium hydroxide solution is put on each scratch and the substances to be tested are rubbed into them, one substance into one scratch, the control scratch receiving no substance. After about fifteen to twenty minutes the test fluid is wiped away and the results are read by comparing the site of each scratch with the control. A positive result is denoted by the appearance of an urticarial weal at the site of the scratch.

The intradermal method is more delicate than the dermal or scratch test but may give rise to severe reactions. An intradermal test is made by injecting a minute quantity, not more than 0.01 c.cm., of the test fluid of known dilution into the most superficial layers of the skin. A positive reaction is shown by the formation of a weal, and an area of surrounding erythema within fifteen minutes. A delayed reaction, consisting of an indurated area at the site of injection, specially in the case of bacterial antigens, may develop within 24 hours.

The protein test can be performed on the mucous membranes instead of on the skin. The ophthalmic reaction is used in cases of pollen allergy. A minute quantity of the pollen solution is introduced into the conjunctival sac. A positive reaction is indicated by itching and redness at the inner canthus, or the whole eye may become red or swollen. The nasal reaction is tested by blowing or spraying the pollen dust into the nose. When the excitant is a food, an oral reaction might be elicited by applying the protein to the lips and the mouth swelling and blistering may be seen in a positive reaction.

The material for doing the dermal test can be obtained in the form of paste in collapsible tubes from Messrs. Parke, Davis and Company. The supernatant fluid obtained by macerating a small amount of the substance in a small quantity of N/10 sodium hydroxide can also be used for the test.

Extracts for use of intradermal testing and for subsequent desensitization if a specific sensitivity is found to be present are made as follows :—

The material is washed with ether to remove fatty matter and is extracted with Evan's alkaline buffered solution. The extracting fluid is kept in concentrated form in two solutions*. For use, 100 c.cm. of each of these two solutions are mixed and made with distilled water to 1,000 c.cm.†. Toluol is used to prevent bacterial growth during the period of extraction. Toluol can be put as a thin layer on the top of the

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*The following are the most common inhalant and ingestant excitants:—

Inhalants: Pollens; hairs of horse, cat, dog, cow, and goat; feathers of chicken, duck or goose; dust from sleeping and working rooms, factories, etc.; face and insect powders, and fungi and moulds.

Ingestants: Wheat, corn, rice, egg, milk, fish, meat, potato, etc.

It is to be noted in connection with the cereals that they can act as excitants on being inhaled, ingested or touched. It may be that a cereal can be well tolerated on ingestion but not on inhalation or contact or *vice versa*. There are people who can eat wheat flour with impunity but handling the flour gives rise to a severe type of dermatitis and its inhalation itching of the nasal mucous membrane, sneezing and watery discharge. Similarly there are persons who can handle wheat flour without any bad effect but who cannot stand it as a diet.

Solution No. 1

NaCl	.. ..	50.00 grammes
KH_2PO_4	.. ..	3.63 ,,
Na_2HPO_4	.. ..	14.31 ,,
Distilled water	..	1,000 c.cm.

Solution No. 2

Carbolic acid	..	4 per cent.

†For extracting pollens and dust Coca's fluid may be used instead with advantage. The composition of the fluid is

NaCl	.. ..	0.5 per cent
$NaHCO_3$	.. ..	0.275 ,,
Carbolic acid	..	0.4 ,,

Carbon dioxide is passed through it until phenolphthalein added to a sample of it remains colourless.

To avoid too great a dilution in extracting fruit and vegetable juice Coca suggests a stronger solution which he calls the preserving fluid one part of which is mixed with four parts of juice. The composition of this fluid is

NaCl	.. ..	2.5 per cent
$NaHCO_3$	.. ..	1.25 ,,
Carbolic acid	..	2.0 ,,

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fluid; with materials like flour it is better to mix toluol well with the dry substance before putting it in the extracting fluid. One to two days' extraction is quite sufficient. The extract is sterilized by passing through a Berkefeld type of filter. It should not be sterilized by boiling. The filtrate should be tested for sterility, both aerobically and anaerobically, before being used. The test should be performed with very weak dilutions to avoid undesirable effects. It is best to commence testing with a one-in-a-million dilution. One gramme of the substance is extracted with 100 c.cm. of the extracting fluid, this gives a 1/100 dilution. Further dilutions of 1/1,000, 1/10,000, 1/100,000 and 1/1,000,000 are made from it.

4. Prausnitz-Kustner reaction. When it is not advisable or practicable to do the usual skin tests, as in infants, nervous patients, patients with extensive and interfering skin lesions or with extremely dermographic skin, or where the patient cannot attend for testing on account of distance or illness Prausnitz-Kustner reaction is tested. It is an indirect test which is performed with the patient's serum using the forearm of a healthy person. The test consists in injecting a small quantity of the serum from an allergic patient intradermally into a non-sensitive subject and then testing the sites of injection—which have been passively sensitized—with antigens to which the allergic patient is thought to be sensitive.

Five to ten cubic centimetres of the blood are withdrawn from the patient and the serum is separated with aseptic precautions. The forearm of the subject on whom the test is to be done is cleansed with alcohol and the serum of the donor is injected at two or more sites depending on the number of proteins to be tested. About 0.1 cubic centimetre of the serum is used for each injection and the site of injection is marked with ink or marking pencil. At least two to three hours should be allowed for the serum to be completely absorbed. Then each site may be tested locally for specific proteins by the scratch method, keeping one site as a control.

5. The best proof of a substance being responsible for the allergic symptoms of a patient is that the substance when brought in contact with the patient should precipitate an attack and its removal should relieve the symptoms. Whenever possible the positive results of dermal or intradermal tests should be checked with this criterion. All positive reactions may not necessarily be true specific reactions. The use of very concentrated solutions or large amounts of solutions in the intracutaneous test and many other causes give rise to false positive reactions.

6. In most cases of allergy a hypodermic injection of 0.3 to 0.5 c.c. of a 1/1,000 solution of adrenalin hydrochloride relieves the symptoms and this forms a good therapeutic test.

7. A careful examination of the stools is made. The allergic cases secondary to gut infection may show an *Entamœba histolytica* infection or the presence of ova of various helminths. The McConkey neutral-red lactose agar plate may show various non-lactose-fermenting bacilli, causing post-dysenteric lesions. These findings are rather important from the treatment point of view.

8. A bacteriological and cultural examination of sputum is made in cases of respiratory allergy keeping the Gram-negative bacilli of Knott and Oriel specially in view.

9. A thorough search is made for any focus of sepsis which may be present in teeth, tonsils, nose, sinuses, appendix, etc.

Treatment of allergy

Immediate treatment.—Adrenalin hydrochloride is the most effective drug in relieving acute allergic symptoms. Usually 0.3 to 0.5 c.cm. of a 1 in 1,000 solution is given subcutaneously. The earlier the injection is given the smaller is the dose required. Graeser and Rowe (1935) have used adrenalin inhalation to cut short the attacks in asthma. A 1 in 100 solution of adrenalin chloride is used in a specially made nebuliser. Adrenalin is not effective when given by mouth. Adrenalin or ephedrine is used in the form of solution, spray, or ointment to relieve the local nasal symptoms in allergic rhinitis. A simple 2 to 3 per cent solution of ephedrine in distilled water may be applied locally to nose and eyes. Adequate local treatment should be given for the skin, joints, etc.

The proper treatment of the condition depends on the results of the investigation of the patient.

I. If the history, skin reactions, or elimination diets give a clue to the specific sensitization, then the treatment can be carried out on the following lines :

(*i*) Avoidance or removal of the specific causes. This is the ideal method of treatment but is practicable only in a minority of cases. Foods that disagree may be eliminated and when the allergy is due to some occupational factor the occupation, if possible, should be changed. Pets can be removed and cotton can be used to stuff the pillows in place of feathers. It is very difficult to avoid dust and pollen unless a dust-free chamber or a face mask is used; residence in the hills above 4,000 feet high excludes most air-borne allergen.

Van Leeuwen (1924, 1927 and 1931) was the first to introduce a dust-free chamber into which filtered air was pumped for the treatment of asthmatic patients. Since the time of his first experiments he has introduced a number of modifications to simplify the apparatus. He reports the results of treatment in 1,000 cases of asthma treated in allergen-free chambers; 70 per cent of the cases remained free, 20 per cent improved, and 10 per cent were refractory to the treatment. Leopold and Leopold (1925) had a special room built in which not only was the air dust and pollen free, but temperature and humidity were controlled as well. Cohen (1927) introduced a portable mechanical filter, operated by electricity, which produced and maintained pollen-free air. The cost of all these is very high and they cannot be available for the use of an average patient. To remove this difficulty Peshkin and Beck (1930) introduced a new and simplified air-filter consisting of a cabinet, rectangular in shape, 25 inches wide, 15 inches high and 9 inches deep, which contains the film screen, a pressure fan and an electric motor (1/30 horse power).

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The whole unit is so comprised as to fit into a window frame and the current consumption is very low. Rappaport, Nelson and Welker (1932) undertook an experiment to determine the effect of air filtration in hay fever and pollen asthma. Their results indicate that air filtration is very effective in relieving the symptom of hay fever but that cases of pollen asthma respond very slowly to it.

(*ii*) In cases where avoidance is impracticable, for example where sensitization to multiple foods exists or where it is not possible to change the occupation, the treatment lies in trying to desensitize the patient against the allergen. In effecting desensitization two routes are available :

(*a*) When the allergen is a common food specific desensitization may be attempted by oral administration of minute but gradually increasing doses of the food in question. The treatment is commenced with very small amounts of food, it is given daily, and the doses are increased very slowly. Bray reports better results if small doses of the food are given with hydrochloric acid and pepsin mixture.

(*b*) In cases of allergy due to dust, pollen, or animal emanations desensitization is carried out by repeated subcutaneous injections of the sterile extract made from the substance. The extract is put up in 1/100, 1/1,000, 1/10,000, 1/100,000 and 1/1,000,000 dilutions. By means of intradermal tests the lowest dilution to which the patient reacts is found out, using 0.01 c.cm. of the different dilutions at a time and beginning with the lowest one. The skin is tested with 1/1,000,000 dilution first; if no reaction is obtained in 5 to 10 minutes the 1/100,000 dilution is tested; and so on till a positive reaction is obtained. Treatment is commenced with 0.1 c.cm. of the dilution next lower to the one that gives a positive test; for example, if the patient reacts with a dilution of 1/10,000, the treatment is commenced with 0.1 c.cm. of a 1/100,000 dilution. Subsequent injections are given at four to seven days' intervals and the dosage is gradually increased according to the patient's reactions. The course of injection occupies from two to three months.

(3) Along with avoiding the cause or desensitization, the co-existing infections or abnormalities of the respiratory or the gastro-intestinal tract should be adequately treated.

(4) Drugs. *Calcium* is reported to have a favourable effect on allergic conditions. The blood calcium value in allergic conditions, though reported to be low by some workers, has been found to be normal by most of the investigators, so that calcium is used only empirically in the treatment of these conditions. If used, calcium should always be given with parathyroid as otherwise it is not assimilated, 10 grains of calcium lactate with 1/10th grain parathyroid may be given first thing in the morning and last thing at night.

Ephedrine may be given orally to control the symptoms during the period when desensitization is being carried on. Half a grain of ephedrine sulphate or hydrochloride given morning and evening is often sufficient. This drug may sometimes give rise to untoward effects and has then to be cut down or totally omitted. The most common disagreeable symptoms that follow the use of the drug are palpitation, nervousness, and tremors, nausea, vomiting, sleeplessness and headache.

Acids. The use of nitro-hydrochloric acid as an adjuvant treatment in cases of allergy has recently been much advocated, specially in view of the disturbance in the acid-base equilibrium to the alkaline side that has been shown to occur amongst allergics. Bray gives 30 to 90 minim doses of acid hydrochlor. dil. (B. P.) three times a day before or with meals in orange or lemon juice.

II. A thorough investigation will often fail to incriminate any particular food or animal emanation. In such cases the treatment is to be carried out on the following lines :

1. In allergy of alimentary origin the antigen absorbed may not be a whole food protein but the proteins may be broken down in an abnormal fashion and the altered proteins pass up to a liver whose proteopexic function is deficient and thus gain access to the general circulation. Or the toxins liberated by the action of bacteria on incompletely digested proteins may be the cause of the conditions. In treating such cases at least four factors have to be taken into account—

(*i*) Any infection found in the gut has to be carefully treated, *Entamœba histolytica* infection by emetine or carbarsone, and hookworm infection by tetrachlorethylene, or an autovaccine may be used to confer immunity against the pathogenic organisms isolated from the stools.

Intestinal stasis, if present, should be adequately treated. Kaolin together with an intestinal lubricant such as liquid paraffin has been used to prevent absorption of toxic substances from the intestines in cases of rheumatoid arthritis.

(*ii*) Acid-pepsin mixture is of great benefit when there is evidence of hypochlorhydria. This is specially useful in children as cases of allergy of alimentary origin are most common at this age.

(*iii*) The patient should be kept on a more-or-less vegetarian diet, meat and fish should be kept down to a minimum.

(*iv*) The liver should be well looked after. Adam recommends acid and liver mixture after meals and a weekly blue pill. Glucose has been found to be useful in allergic conditions by Osman (1929) and Cameron (1929). Glucose therapy affords the simplest and most rapid method of increasing the glycogen content of the liver, upon an adequate supply of which its

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proteopexic and antitoxic functions have been shown to depend. Glucose has been found to be specially effective in the case of children; in adults it is not so useful. Barber and Oriel (1928) recommend 2 to 4 ounces of glucose to be taken daily in divided doses. Glucose may be taken with meals or dissolved in water and flavoured with orange or lemon juice; it can be taken morning and evening on an empty stomach.

2. A thorough search should be made for any focus of infection in the teeth, tonsils, sinuses, bronchi, etc. Infective foci which can be removed should be dealt with surgically*. When the source of infection cannot be removed, an auto-vaccine prepared from the organisms isolated from the focus should be used. Special significance is attached to the vaccine prepared from the Gram-negative bacilli isolated from the sputum. Knott and Oriel (1930) found that these bacilli during their growth in the bronchi produce histamine. Oriel considers that local production of histamine in the bronchi in addition to causing a contraction of the plain muscles surrounding the bronchi would also tend to increase the permeability of the epithelium lining the bronchioles and facilitate the entrance of foreign proteins and possibly bacteria.

3. Non-specific protein therapy. The object of this form of treatment is to exhaust the sensitivity of the patient. Cecil (1935) thinks 'the most important function of the foreign protein reaction is the mobilization of immune bodies in the circulating blood'. Mackenzie and Frühbauer (1927) have shown that in rabbits, which were previously injected with horse serum but in which the antibody to horse serum had disappeared, subsequent injections of chicken serum caused antibodies to horse serum to reappear. Petersen and others (1923) have shown that very small doses of peptone caused a lessened permeability of the endothelium. Hektoen (1935) believes that in the reaction to non-specific protein therapy important processes take place in the capillary walls and in the reticulo-endothelial system.

Protein therapy should not be used in the presence of active or quiescent pulmonary tuberculosis, cardiac or renal diseases, during pregnancy, in cases of exhaustion or in chronic alcoholics.

There are a number of substances which have been used for the purpose of non-specific therapy, *e.g.*, peptone, serum peptone, proteoses, histamine, sulphur, autogenous blood, stock vaccines, auto-vaccines, tuberculin, gold salts, cobra venom and parasitic extracts.

4. The remarks about the use of calcium, ephedrine, and dilute hydrochloric acid as adjuvants in the treatment given under the treatment of specific sensitivity apply here as well. In cases of allergy where an endocrine basis is suggested gland therapy may be of value. The suprarenals, thyroid and sex glands are most commonly involved. The desiccated glands may be given by mouth, but this procedure is only effective in the case of thyroid. Englebach (1932) has pointed out that only two of all the active principles of internal glands are effective when given by mouth. These two are thyroid and emmenin which are extracted from human placenta. In cases where hypoadrenia is apparent Bray gives ephedrine by mouth regularly. In patients in whom some definite relationship exists between their asthmatic attack and menstrual periods the attacks have been prevented by injections of corpus luteum. Injections of arsenical preparations such as soamin are used to tone up the endocrine system.

* Operative measures on the nose, tonsils and sinuses, etc., are not always successful, because the conditions calling for the operation may not be the cause of allergy.

SUMMARY

Manifestations of allergy

Respiratory tract: hay fever, paroxysmal rhinitis and asthma.

Skin: urticaria, giant urticaria, dermatographia, dermatitis venenata, certain forms of eczemas and a variety of skin eruptions.

Gastro-intestinal tract: certain forms of gastritis, enteritis, mucous colitis and cyclical vomiting.

Nervous system: certain cases of migraine and epilepsy.

Joints: Paroxysmal hydrarthrosis and rheumatoid arthritis.

Urino-genital system: certain forms of enuresis in children.

Diagnosis of allergy

1. A history of inheritance is usually present.
2. The disease usually comes on early in life.
3. There may be an association of the disease with particular place, food, animals, pollens, etc.
4. There is a definite periodicity in the early stages of the allergic conditions.
5. There is usually high blood eosinophilia.
6. Protein skin tests may be positive to some excitants. Indirect skin test, *i.e.*, the Prausnitz-Kustner reaction may be positive.
7. The best proof of a substance being responsible for the allergic symptoms of a patient is that the substance when brought in contact with the patient precipitates an attack and its removal relieves the symptoms.
8. A hypodermic injection of 0.3 to 0.5 c.cm. of a 1 in 1,000 solution of adrenalin chloride relieves the symptoms in most cases of allergy.

Treatment of allergy

The acute symptoms are relieved by a hypodermic injection of a 1 in 1,000 solution of adrenalin chloride. Inhalation of a 1 in 100 solution of adrenalin chloride in a special inhaler is useful to cut short the attacks of

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'OVALTINE'

In Wasting Diseases

TO replace the tissue wastage and decrease in energy associated with wasting diseases, is a problem often rendered more difficult by the fact that there is frequently an associated anorexia and enfeeblement of the digestive and assimilative processes.

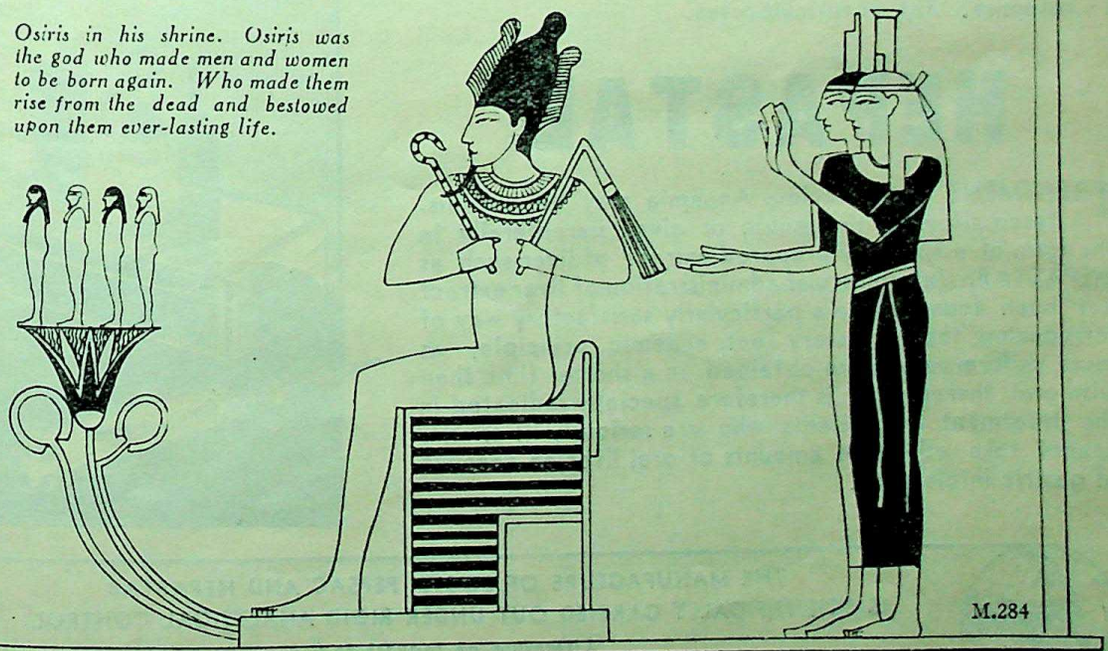
'OVALTINE' has proved to be the ideal stand by in many such cases, because it is an energizing and reconstructive nutrient, complete in all the essential food elements. It is almost invariably well tolerated even by disordered stomachs and is practically completely absorbed into the blood-stream.

The unique dietetic value of 'OVALTINE' is derived from its content of fresh food substances—full-cream milk and malt extract. Noteworthy features are its high percentage of maltose and its entire freedom from cane sugar, starch or other undesirable constituents.

A liberal supply for clinical trial sent free on request.

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Osiris in his shrine. Osiris was the god who made men and women to be born again. Who made them rise from the dead and bestowed upon them ever-lasting life.

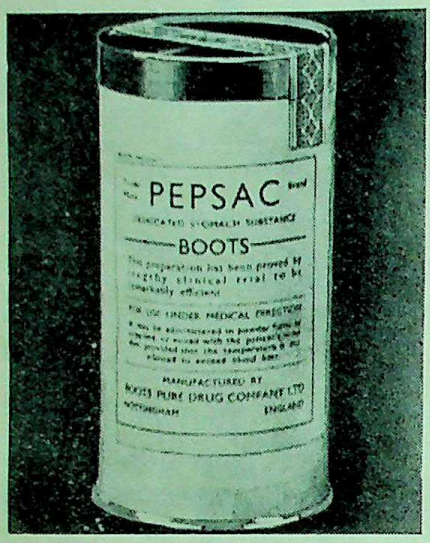


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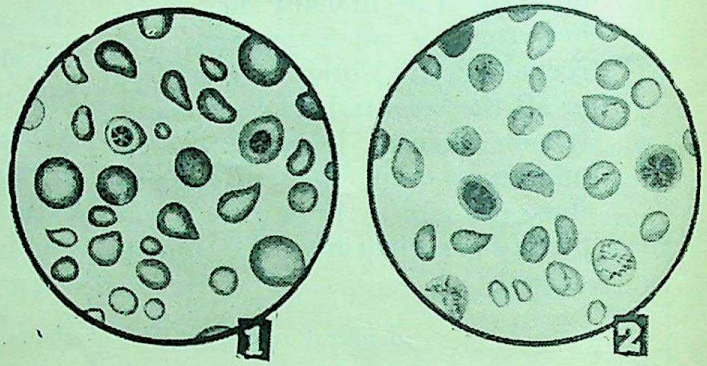
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The Latest Treatment for PERNICIOUS ANAEMIA



PEPSAC

PEPSAC is a desiccated stomach powder for the treatment of Pernicious Anaemia, prepared from fresh, healthy hog's stomachs which have been subjected to critical veterinary inspection before use. Every stage of manufacture is controlled bacteriologically, and the desiccation is carried out under the most exacting conditions in order to preserve the haemopoietic principles of the stomach tissue.

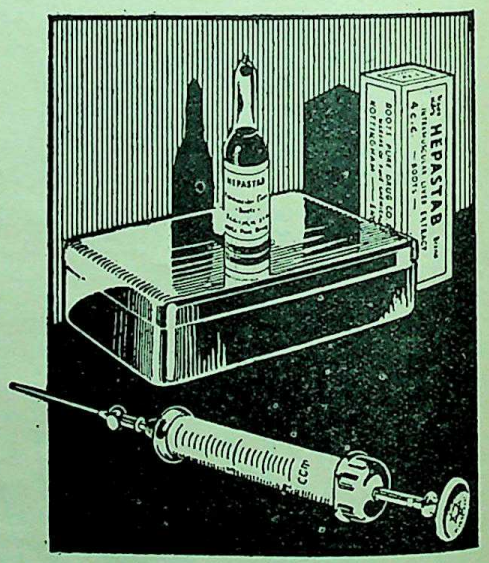


1 BLOOD film from an untreated case of Pernicious Anaemia, showing anisocytosis, poikilocytosis, polychromasia and nucleated red cells.

2 BLOOD film from a case of Pernicious Anaemia after eight days' treatment with Pepsac, showing reticulocyte response. 32% of reticulocytes.

HEPASTAB

TREATMENT for Pernicious Anaemia may be administered either by the mouth or given parenterally in the form of a specially prepared extract of liver such as HEPASTAB. Intramuscular administration of liver extract has been found to be a particularly satisfactory way of introducing the necessary anti-anaemic principle, as more uniform results are obtained in a shorter time than with oral therapy. It is therefore specially indicated in the treatment of patients who are seriously ill or who cannot take adequate amounts of oral liver on account of gastric intolerance.



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THE MANUFACTURE OF BOOTS' PEPSAC AND HEPASTAB IS SCIENTIFICALLY CARRIED OUT UNDER RIGID ANALYTICAL CONTROL.

Literature on request to :

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asthma. Ointments and sprays containing adrenalin and ephedrine are of value in the local treatment of the nose and a solution of ephedrine in distilled water is efficacious for local treatment of the allergic conditions of the eyes.

The treatment between the attacks—

1. If any clue is found to the specific antigen—

(*a*) avoid or remove the specific cause, or

(*b*) desensitize the patient with pollen, dust or epidermal extracts or with minute quantities of the food, etc., as the case may be, and

(*c*) along with avoiding the cause or desensitizing the patient any co-existing infections or abnormalities of the respiratory or gastro-intestinal tract should be adequately treated. Any evident endocrine dysfunction should be attended to. Calcium, ephedrine and dilute hydrochloric acid can be used in suitable cases.

2. If no clue is found to the specific antigen.

(1) In cases of gut origin—

(*a*) any infection found in the gut should be carefully treated,

(*b*) an acid-pepsin mixture is of great benefit when there is an evidence of hypochlorhydria,

(*c*) the patient should be kept on a more-or-less vegetarian diet, and

(*d*) liver should be well looked after; 2 to 4 ounces of glucose taken daily in divided doses are very efficacious in children.

(2) A thorough search should be made for any focus of infection and, if present, it should be adequately treated surgically by means of auto-vaccines.

3. Non-specific desensitization may be tried with peptone, serum peptone, auto-hæmotherapy, milk, sulphur, tuberculin, T.A.B. vaccine, etc.

4. Endocrine therapy may be tried in suitable cases. Calcium, ephedrine and dilute hydrochloric acid may be used in some cases.

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Medical News

ROYAL LONDON OPHTHALMIC HOSPITAL

('MOORFIELDS')

Medical School (University of London)

IT is probable that during the time of the Coronation some old students of Moorfields, from overseas, will be in London. The Dean of the Medical School, Royal London Ophthalmic Hospital, is, therefore, preparing a short series of demonstrations that they may like to attend, and the following programme is being arranged:—

1.	Exhibition of ophthalmoscopic conditions.	Tuesday, 4th May, at 5-30 p.m.
2.	Exhibition of slit-lamp cases.	Thursday, 6th May, at 5-30 p.m.
3.	Operation demonstrations: (*a*) Cataract. (*b*) Glaucoma. (*c*) Detachment. (*d*) Squint.	
	A selection of the above on the mornings of	Monday, 3rd May. Wednesday, 5th May. Friday, 7th May.
4.	Orthoptics	Tuesday, 4th May, at 10 a.m.
5.	Pathological exhibitions ..	Wednesday, 5th May, at 5-30 p.m.

The Dean informs us that they will be pleased to welcome any of their friends, and it would make arrangements easier if they would be so good as to send him notice of their intention to attend the course.

THE XIII ALL-INDIA MEDICAL CONFERENCE, 1936, KARACHI

WE give below some of the more important resolutions passed at the conference:—

This conference is of opinion that there is an urgent and vital need of passing legislation in the shape of a *Pure Drug Act and Pharmacy Act* for British India, on the lines of that of United States of America, for the purpose of controlling the sale of drugs, as well as laying down the qualifications of the dispensers of drugs.

(*a*) This conference calls the attention of the medical profession, the government and municipalities to the urgent need of research in causes of malnutrition of the poor people of India and into the dietaries in various parts of India, and for the standardization of 'balanced diets' in different provinces, in accordance with the local dietetic customs of the people and the foods available during different seasons of the year.

(*b*) This conference desires to draw the attention of the government and the leaders of India to the fact that deficiency anæmias and diseases, tuberculosis, rickets, dental caries, infectious diseases, etc., spring from malnutrition. That the problem of prevention of diseases is partly a problem of the provision of sufficient and nutritious food for the people.

Whereas tuberculosis or white plague is insidiously making rapid inroads into populous cities in India and is responsible for high mortality incidence as shown by the vital statistics of the prominent municipal bodies in the country,

And whereas the disease is more or less endemic among the poorer section of the community and particularly among the children of school-going age whose parents and guardians can ill-afford to supply them with adequate amount of nourishing food like milk, fruits and eggs,

And whereas these children grow up poor in vitality with low resisting power which makes them more susceptible to tuberculous infection at this tender age,

This conference strongly urges upon various local bodies, district and local boards, educational institutions, government and private, carefully to collect the statistics of the disease in their respective jurisdictions, especially amongst children of school-going age, and inaugurate schemes of free milk supply to deserving children of poor parentage in humbler quarters of the cities, to provide them with adequate nutrition to fortify their constitution against the fell disease. The conference confidently hopes that such schemes, if earnestly pushed forward and assiduously carried out, will succeed in their object of building up healthy generation of manhood and womanhood.

This conference resolves that in view of the exhibition of obscene and indecent advertisement by means of newspapers, bills, and posters regarding medicines which are a nuisance and detrimental to the health of the public, particularly the young inexperienced girls and boys, the central and local governments and the local bodies be requested to take strong action to stop it.

Resolved that the government be requested to make the scheme for periodic health examination of school children compulsory and steps be taken for the preparation of a suitable scheme for the training of medical men for the purpose.

This conference requests the Government of India:—

(*a*) to amend the Indian Medical Degrees Act of 1916 in such a way as to make it unlawful for the unqualified persons to write any letters or words, with their names which may denote in a direct or indirect way the resemblance of these letters or words to be genuine or *bona fide* medical degrees, and

(*b*) to declare it an unlawful practice for such unqualified persons to place or write the designation of 'doctor' before their names.

This conference views with great concern the recent influx of a large number of doctors from foreign countries with which there does not exist any reciprocity and requests the government to take necessary measures to prevent such influx.

Resolved that in the opinion of this conference, registered medical practitioners should not have any connection with unaffiliated institutions for the teaching of the Western scientific system of medicine.

Resolved that this conference requests the government to initiate legislation to prevent any individual or corporate body to start or run any institution for the teaching of the Western scientific system of medicine, until such an individual or body satisfy some preliminary minimum requirements to be prescribed by the provincial medical councils.

Resolved that this conference views with alarm the rapid increase of 'open chemists' shops' owned and managed by the registered medical practitioners where consultation may be obtained free by all classes of people irrespective of their income or position in society.

Resolved further that this conference is of opinion that it should be declared unethical for registered medical practitioners to have any connection with an open shop where prescriptions other than his own or of other registered medical practitioners are served.

Resolved that this conference views with concern the growing tendency of the well-to-do and middle class public of utilizing free hospital facilities and thereby shutting out from the hospitals some of the poorer section of the public for whom such facilities are primarily intended and depriving the general practitioners of their legitimate income and experience.

Resolved that the Indian Medical Association be requested to take active and early steps to remedy the above state of affairs.

Resolved that this conference notes with regret the policy of some of the teaching institutions (official and non-official) in permitting their staff in charge of beds to hold positions in more than one teaching institution, leading to a state of affairs which is detrimental to the efficiency of the institutions.

Resolution:—

(*a*) Rural medical relief and sanitation being intimately connected with any scheme of village

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reconstruction as fundamentally affecting the economic prosperity of a predominantly agricultural country like India, this conference is strongly of opinion that the Government of India and the provincial governments in the coming autonomous provinces should revise their public health policy in its essential aspects and give proper attention to it in their annual budgets.

(*b*) In provinces like Sind and the Punjab and others, where irrigation projects of immense importance and great magnitude have been launched and vast areas of land are under water for greater part of the year, this conference notes with regret that no adequate sanitary or drainage arrangements have been provided *pari passu* with the irrigation schemes. This deplorable state of affairs has resulted in unprecedented water-logging of such areas with consequent high malarial morbidity and mortality which has undermined the health of the countryside with considerable loss of man-power and economic ruination.

(*c*) While recording its sense of appreciation of the recognition, none too early, by the government of the paramount importance of rural reconstruction and the provision of the funds, however inadequate, in the central budget for the purpose, this conference is emphatically of opinion that such half-hearted measures will not touch even the fringe of the problem. It urges the governments, central as well as provincial, to make public health in the village reorganization the first charge on the state revenue; to set up sufficient rural dispensaries under qualified hands; to organize health and sanitation committees, child and maternity welfare centres and provide training facilities for *dais;* to undertake drainage and sanitary schemes in water-logged areas, and to push antimalarial measures with all the vigour and liberalize the quinine policy.

This conference is of opinion that the medical schools of the present day have outlived their usefulness and should either be brought in conformity with the minimum requirements laid down by the Indian Medical Council or be closed down without any further delay.

THE INDIAN HONOURS LIST

1ST FEBRUARY, 1937

THE following are the names of medical workers in the Indian Honours List of 1st February, 1937. We offer them our congratulations:—

C.I.E.

Lieutenant-Colonel R. E. Flowerdew, I.M.S., Inspector-General of Prisons, Bengal.

G. C. Ramsay, Deputy Director of the Ross Institute of Tropical Hygiene and the London School of Hygiene and Tropical Medicine.

M.B.E.

M. D. R. David, Third Surgeon, General Hospital, and Police Surgeon, Rangoon.

Major H. C. Phillips, I.M.D., Superintendent of the Punjab Vaccine Institute, Lahore.

E. Duckworth, I.M.D., Manager, Medical Store Depôt, Lahore Cantonment.

C.B.

Major-General A. W. M. Harvey, I.M.S., Deputy Director of Medical Services, Northern Command.

O.B.E.

Lieutenant-Colonel G. B. Hanna, I.M.S., Officer Commanding Indian Military Hospital, Quetta.

Kaiser-i-Hind Medal

(First Class)

Miss H. Betteridge, lately Superintending Missionary of the Zenana Bible and Medical Mission, Bombay.

Miss N. Hill, Organizing Secretary, Indian Red Cross Society and General Secretary, St. John Ambulance Association, Indian Council.

Lieutenant-Colonel G. M. Millar, I.M.S. (retired), Director, Medical Services, Jammu and Kashmir State.

Bar to the Kaiser-i-Hind Medal

(First Class)

Miss L. H. Hart, M.D., Medical Missionary, Madanapalle, Chittoor District, Madras.

Kaiser-i-Hind Medal

(Second Class)

Miss C. B. Allinson, Church Mission Zenana Hospital, Dera Ismail Khan, North-West Frontier Province.

Mrs. V. Inglis.

Mrs. E. F. Lethbridge, Lady Doctor at Kamaran, Quarantine Station, Aden.

Mrs. A. F. Morgan, Matron, Indian Hospital, Khargpur.

Miss M. O'Neill, Matron, Dai Khana, Ajmer-Merwara.

Miss N. Pathie, Assistant Surgeon, Dufferin Hospital, Rangoon.

Dr. J. A. M. Smith, Missionary, Church of Scotland Mission, Kalimpong, Bengal.

Kaiser-i-Hind Medal

(Third Class)

Miss V. North, Sister in charge of the Carmichael Hospital for Tropical Diseases, Bengal.

Khan Bahadur

Dr. S. A. H. Jafri, Bengal.

Rai Bahadur

Rai Sahib Dr. B. B. Mullick, Saran, Bihar.

Jemadar P. Bali, I.M.D., Sub-Assistant Surgeon, Cantonment General Hospital, Rawalpindi.

H. A. Shumshuddin Sahib Bahadur, Unani Doctor, Mayavaram, Tanjore District, Madras.

Rai Sahib

Dr. N. Pal, Patna Medical College Hospital, Patna.

Subedar K. C. Kapur, I.M.D., Fort Sandeman, Baluchistan.

Captain D. Shluwuliu, I.M.S., Bundi State, Rajputana.

MEDICAL COUNCIL OF INDIA

THE Seventh Session of the Medical Council of India was held on 12th February, 1937, in the Imperial Secretariat, New Delhi, 27 members being present, with Major-General Sir Cuthbert Sprawson in the chair.

The president, in his address, reviewed the activities of the council and on the eve of his retirement while wishing good-bye expressed satisfaction on its achievements.

A motion of condolence with the widow of the late Colonel H. H. Thorburn who represented the North-West Frontier Province Government on the council was adopted, all standing.

Colonel K. V. Kukday was re-elected vice-president of the council.

The following members were re-elected to the executive committee of the council:—

Dr. B. C. Ray.
Rai Bahadur Dr. B. N. Vyas.
Dr. Abraham S. Erulkar.
Lieutenant-Colonel S. L. Bhatia.
Rai Bahadur Dr. Maharaj Krishna Kapur.

The council considered the draft recommendations on professional education together with the observations of the universities thereon. With a few modifications they were adopted and it was decided that they should come into operation from the commencement of the academic year 1939.

The council accepted the regulations and rules of the Medical Council of India with some alterations and it was directed that they should come into force with effect from 1st April, 1937.

The council considered the question of the recognition of foreign medical degrees of repute when held by Indian nationals. The council was of opinion that Indian nationals who have obtained medical qualifications of repute in foreign countries should not be

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granted recognition in India unless such foreign countries recognize the medical qualifications of this country on a basis of complete reciprocity.

The council noted the decision of the executive committee that the question of the recognition of the medical qualifications of Andhra University should be postponed.

After transacting various routine business it was decided that the next meeting of the council be held on 25th August, 1937, in Simla.

Current Topics

The State of Nutrition of School Children in South India

PART I

By W. R. AYKROYD

and

K. RAJAGOPAL

(Abstracted from the *Indian Journal of Medical Research*, Vol. XXIV, No. 2, October, 1936, p. 419)

IN spite of a growing realization that the diet of a large proportion of the population of India is unsatisfactory, few surveys of the incidence of malnutrition among school children, and others, have hitherto been carried out.

In the present investigation 1,918 children between the ages of 6 and 17 in three South Indian towns, Coonoor, Mettupalayam and Calicut, were weighed and measured. These children (with a further 85, making 2,003 in all) were examined to discover the frequency of xerophthalmia, 'angular stomatitis' and phrynoderma. In addition, the A. C. H. index of nutrition was applied to 1,145 of these children belonging to the age group 6 to 12. The association between the presence of the above symptoms and subnormal height and weight, and between the former and 'selection' by the A. C. H. index, has also been studied.

PHRYNODERMA

Dryness of the skin has often been noted in famine victims, and earlier writers on keratomalacia mention the presence of this symptom. Frazier and Hu described a follicular keratosis of the skin occurring in association with xerophthalmia and keratomalacia. They recorded that the eruption involved chiefly 'the exterior surfaces of the extremities, the trunk, and finally the posterior aspect of the neck..... Histologically, the pathologic process was primarily a hyperkeratinization of the lining epithelium of the hair follicles resulting in the obstruction of the follicles, particularly at the upper portion, by a dense mass of lamellated cornified cells'. Nicholls described this condition in Ceylon and gave it the name 'phrynoderma' (toad-skin) which has been adopted by other writers. The histopathology of the condition appears to resemble that of the classical *pityriasis rubra pilaris*.

In our investigation the outer surfaces of the arms were examined for phrynoderma. Only the presence of marked degrees of the condition was noted, *i.e.*, cases which gave to the finger tips the sensation of passing over a rough surface. Mere dryness of the skin, which was found to be present in a very high percentage of children examined, was not recorded. There were naturally many border-line cases which were difficult to assign to the positive or negative groups. We tried, however, to keep the same standards throughout.

Phrynoderma is unquestionably due to diet deficiency, but evidence has been obtained that vitamin-A deficiency may not be the primary factor.

ANGULAR STOMATITIS

In the present investigation marked degrees of angular stomatitis were recorded. In many cases the interior of the mouth was examined also, and it is our experience that when fissures are present at the angles of the mouth the anterior part of the tongue will be found to be red and glazed. For rapid examination, however, 'angular stomatitis' is convenient. Nicholls, in carrying out examinations of school children in Ceylon, recorded the incidence of 'sore-mouth' differently. To quote his words: 'The standard adopted has been patches of superficial erosion of the mucous membrane of the tongue or lower lip, or its later stages, when the tongue becomes red or glazed. These patches are red and are in marked contrast to the unaffected parts of the tongue which show the whitish *duvet* of the slight normal fur. Some children with sore-mouths have excoriation and ulceration of the angles of the mouth. But when they have this condition without signs of erosion of the mucous membrane of the tongue or lower lip they are considered negative'.

XEROPHTHALMIA

Wright recorded the commonness of xerophthalmia and keratomalacia in the Madras Presidency. Xerophthalmia has been observed in some 26 per cent of children in famine camps in South India by Aykroyd and Krishnan. In the present investigation we noted all degrees of dryness of the conjunctiva, but in the final records we have included only cases showing 'Bitot's spots'. The yellowish foamy patches on the conjunctiva which are known by this name are easy to observe, and a convenient sign in routine examinations by non-ophthalmologists.

Clinical signs of deficiency disease in 'poor' and 'better class' schools (Coonoor).

		Number examined	Number showing one or more clinical signs	Percentage	Number showing phrynoderma	Percentage	Number showing angular stomatitis	Percentage	Number showing Bitot's spots	Percentage
'Poor' schools	Boys ..	158	50	31.6	26	16.5	25	15.8	10	6.3
	Girls ..	62	12	19.4	8	13.0	6	9.7	0	..
'Better class' schools.	Boys ..	621	65	10.5	41	6.6	43	7.0	6	1.0
	Girls ..	212	29	13.7	21	9.9	15	7.1	1	0.8

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GROUP	TYPE	CASES	RESULT
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II Subnormal Testis Subnormal Child	Bilateral - -	6	Cured
	Bilateral & hypospadias - - -	2	
	Unilateral - -	3	
III Subnormal Testis Normal Child	Unilateral - -	3	Cured
	Bilateral - -	3	Improved

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INCIDENCE OF CLINICAL SIGNS AT DIFFERENT ECONOMIC LEVELS

In the course of our examinations it became obvious that the children in the poorest schools in Coonoor were in a more wretched 'state of nutrition' than the children in the other schools. We have divided Coonoor schools into two groups, 'poor' and 'better class', and compared the incidence of signs of deficiency disease in each group. The 'poor' schools include two schools for the children of *dhobies* (washermen) and sweepers. 'Better class' is something of a euphemism, because many children of very poor parents attend these schools also. But at least it can be stated that poverty was less extreme in this group than in the other. The table below compares the incidence of clinical signs in the two types of schools. It was considerably higher in the 'poor' schools.

THE A. C. H. INDEX

The A. C. H. measurements of 1,145 children were determined. Column three of the following table shows the percentage 'selected' of boys and girls in the various towns. In the sixth column of figures the percentage of cases showing clinical signs in the group who are 'selected' by the index is given, and in the ninth the percentage 'selected' of cases *not* showing clinical signs.

Selection by the A. C. H. index and its association with clinical signs of deficiency disease.

		Number A. C. H. index taken	Number selected	Per cent selected	Number showing clinical signs	Number selected of those showing clinical signs	Per cent selected	Number not showing clinical signs	Number selected of those not showing clinical signs	Per cent selected
Coonoor	Boys ..	314	102	32.5	90	52	57.8	224	50	22.3
	Girls ..	105	22	21.0	23	10	43.5	82	12	14.6
Mettupalayam	Boys ..	211	72	34.0	64	51	79.7	147	21	14.3
	Girls ..	45	14	31.1	6	4	66.7	39	10	25.6
Calicut	Boys ..	396	70	17.7	48	32	66.7	348	38	10.9
	Girls ..	74	14	18.9	4	1	25.0	70	13	18.6
All children ..		1,145	294	25.7	235	150	63.8	910	144	15.8

Of all children examined, 25.7 per cent were 'selected'. Taking both sexes together, a slightly higher percentage was 'selected' in Mettupalayam than in Coonoor (33.6 and 29.6 per cent respectively). In Calicut, the percentage of both sexes 'selected' was much smaller (17.8).

The percentages of all cases showing clinical signs who are 'selected' by the index was 63.8; the percentage 'selected' of those *not* showing signs was 15.8. There is thus an association between 'selection' by the index and the presence of clinical signs of deficiency disease.

SUMMARY

Average height and weight for the age group 6 to 15 (boys) was determined. The averages are compared graphically with those of other groups in Indian, Ceylonese, British and American boys. Indian children of a given height weigh very much less than British or American children of the same height.

In 14 per cent symptoms of food deficiency disease were present. 6.4 per cent showed phrynoderma, 9.2 per cent angular stomatitis, and 3.8 per cent Bitot's spots. The incidence of two former conditions in the children examined is compared with that recorded by other observers in groups elsewhere.

The A. C. H. index was applied to 1,145 children between 6 and 12. Of these 25.7 per cent were 'selected'. There is an association between 'selection' by the index and the presence of symptoms of deficiency disease, but the index 'misses' a considerable number of children showing such symptoms. It is suggested that the index needs adjustments to make it suitable for routine work in India.

The main result of our inquiry is to show that malnutrition due to diet deficiency is very prevalent among school children in three South Indian towns. It may be added that dietary deficiency was evidenced not only as described but also by the general appearance, posture and bearing of a large proportion of the children examined. The same state of affairs probably exists in towns and villages throughout the Madras Presidency. While it is only to be expected that children living on a diet largely composed of rice, with practically no milk and very few vegetables, should show obvious signs of malnutrition, it is useful to have some exact data on this point. Systematic surveys of the state of nutrition of school children, following the lines of the present investigation, would throw great light on the problem of nutrition in India.

Stomatitis Due to Vitamin-B_2 Deficiency

By W. R. AYKROYD

and

B. G. KRISHNAN

(Abstracted from the *Indian Journal of Medical Research*, Vol. XXIV, No. 2, October, 1936, p. 411)

STOMATITIS with erosions of the lips and angles of the mouth occurring in ill-nourished groups has been described by a number of observers.

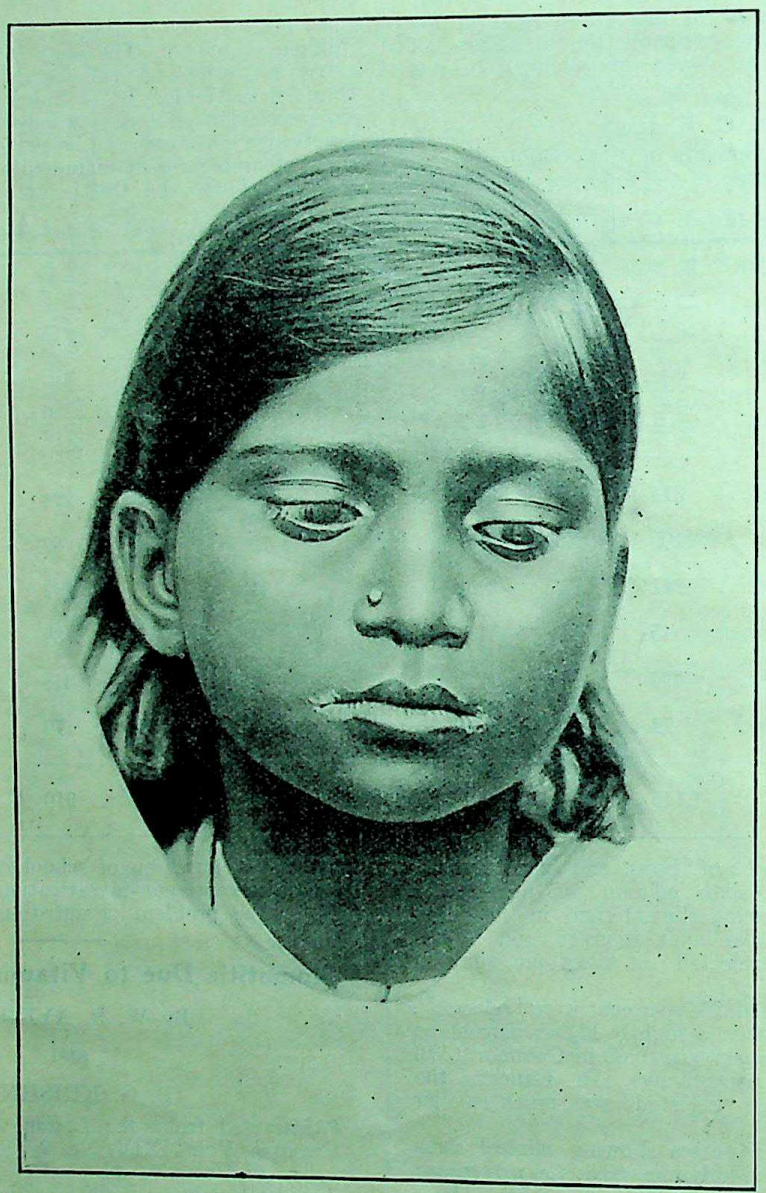
In a typical case white patches are visible at the angles of the mouth. The epithelium in this area has a sodden appearance, and the presence of fungus infection is suggested. White patches may extend inwards from the angles of the mouth to the mucous membrane of the cheek. Fissures are often present at the labial angles. Erosion of the mucous membrane of the tongue, particularly marked at the sides and the tip, is usually observed. Sometimes cracks are visible on the surface of the anterior part of the tongue. In severe cases much of the anterior part of the buccal cavity is red and eroded, and eating is painful. The posterior part of the cavity and the larynx appear not to be involved in the type of case usually encountered.

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The general term 'sore-mouth' is often used by the laity to describe the condition.

We have found stomatitis of this type to be very common in children in South India, both in those attending day schools and those living in residential hostels. In the present paper the type of diet which leads to stomatitis is described, and evidence is produced to show that the condition is due to deficiency of one or more of the factors present in the vitamin-B_2 complex. During an investigation of diet in relation to 'state of nutrition' in children's boarding schools and hostels we found a boys' and a girls' hostel, within a short distance of each other and supported by the same mission, in which a high percentage of children was suffering from stomatitis. These hostels were within a few miles of Coonoor and an opportunity arose of trying different forms of dietary treatment for this condition.



Typical appearance of 'angular stomatitis' in a girl aged 10.*

STOMATITIS AND DIET IN THE HOSTELS

There were 32 pupils in the boys' hostel, and 35 in the girls'. All ages between 7 and 19 were represented, the majority of children being from 10 to 16. Of the boys 16 (50 per cent) and of the girls 25 (71 per cent) were found to be suffering from 'angular stomatitis'—fissures at the angles of the mouth. In the majority of these cases 'sore-mouth' with erosion of the tongue was present.

The diets were composed largely of milled parboiled rice, other foods being present in small quantities. Judged by the usual standards both diets were deficient as regards almost all the food factors enumerated. The diet of the boys was the more deficient of the two, particularly as regards calcium. Diets of this type, in which rice predominates and the amount of protective foods included is small, are those usually found in association with stomatitis. Xerophthalmia and 'phrynoderma' were also observed among the children, the latter condition in a high percentage; we are not, however, concerned here with these conditions. The general state of nutrition of the children was visibly very poor.

The cost of food in the boys' and girls' hostels was about Rs. 2-3 and Rs. 2-9 per child per month, respectively. At this level of expenditure very little variation in diet is possible, and the diets described may be taken as typical of those consumed throughout the year.

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TREATMENT OF STOMATITIS

The nine worst cases in the boys' hostel were chosen; all these showed glossitis in addition to fissures at the angles of the mouth. Five were given 0.5 oz. (14.0 g.) daily of cod-liver oil for three weeks. No improvement was observed. Simultaneously the other four cases were given 1 oz. daily of dried brewer's yeast (obtained from a local brewery). Improvement was visible in one week and within four weeks the white patches and erosion at the angles of the mouth, and the soreness of the tongue, had disappeared.

The five cases not improved by cod-liver oil were given daily 1 oz. of dried yeast autoclaved for five hours at 120°C. One other boy not previously treated was included in this group. Four cases were cured within four to five weeks. One boy left the hostel after four weeks' treatment with autoclaved yeast very much improved but still showing slight evidence of stomatitis. In the sixth case all signs of stomatitis did not disappear until after seven weeks' treatment. This boy complained of abdominal pain after taking yeast. We gained the impression that autoclaved yeast has a slightly less rapid action on 'sore-mouth' than unheated yeast.

During the period of treatment by unheated and autoclaved yeast all boys consumed the ordinary hostel diet and no changes were made in this diet. No improvement took place in cases receiving no diet supplements, so that the disappearance of stomatitis can not be attributed to a seasonal factor.

On the date that treatment was begun in the boys' hostel, the girls' diet was supplemented by 1.5 oz. (42 g.) of New Zealand dried skim milk daily. This was taken in liquid form, 8 oz. of water being added per oz. of milk powder to reconstitute liquid skim milk. Careful supervision ensured that each girl drank her ration of 12 oz. of liquid skim milk. All the girls were given milk.

Improvement in stomatitis was visible in a week, and within three to four weeks all cases were cured. The condition was possibly somewhat less severe among the girls than among the boys, although present in a larger percentage of the former. Among the girls there were no 'control' cases not receiving milk, but the rapid improvement which took place when milk was given left us in no doubt that milk was the operative factor. During the same period a number of boys with stomatitis in the neighbouring hostel, on a very similar diet without milk, showed no improvement. Subsequent laboratory investigation showed that the skim milk powder used was devoid of vitamin A.

Brief mention may be made here of the change which took place in the appearance and bearing of the children receiving skim milk and yeast. This was peculiarly striking among the girls receiving milk. It can perhaps best be described as an enhancement of *vitality*, very evident to the observer. Complexions improved and eyes brightened. A rapid increase in weight was observed. We propose to carry out further experiments on the effect of milk (whole or skim) as a supplement to the diet of South Indian children, and in particular to observe its effect on growth.

DISCUSSION

Landor and Pallister have recently described stomatitis occurring in gaols in Malaya, which was found to be curable by yeast and marmite, fresh or autoclaved, and also by fresh liver. In its more advanced stages stomatitis was associated with spastic paraplegia and dimness of vision. We have ourselves observed an outbreak of stomatitis in a gaol in South India, precisely similar to that recorded by Landor and Pallister, in which treatment by dried yeast and fresh cooked liver proved rapidly effective. In the same gaol an outbreak occurred a few years ago, in the course of which some patients developed spastic paraplegia. In these instances stomatitis was associated with the consumption of a deficient diet, largely composed of rice.

We have not observed any evidence of involvement of the central nervous system in children suffering from stomatitis.

Nothing suggesting pellagrous dermatitis was present in our cases and there were no signs of the mental changes characteristic of pellagra. Diarrhœa was absent. We have observed nothing resembling pellagra in the course of extensive field work in the Madras Presidency. At the same time the mouth condition described resembles that seen in the earlier stages of pellagra. 'In the first stage (of pellagra) we observe sodden fissured conditions at the angles of the mouth, a large indented tongue with central coating and bare glistening slides and tip, often with a shiny mucous coating these red borders and red buccal mucosa. The fungiform papillæ appear as pinhead red elevations'. This is practically a description of the condition observed by us.

Possibly, therefore, we are dealing with a deficiency disease in which *one* of the symptoms of pellagra is present. The disease is curable by fresh unheated or autoclaved yeast, liver and skim milk. It follows that the B_2 group of vitamins is concerned. In our investigations vitamin-A deficiency was excluded by the fact that cod-liver oil produced no beneficial effect. There was no lack of vitamin B_1 in the diet of the hostels, since the staple cereal included was parboiled rice which retains vitamin B_1 after milling.

The observation that one of the most common food-deficiency diseases in the East is due to lack of one of the B_2 group of vitamins is of practical importance. One had been inclined to think that the greatest qualitative defect of the diets of the poorer classes in the East was their insufficient vitamin-A and carotene content. Cheap and convenient methods of supplying the deficient vitamin-B_2 factor must be the subject of further investigation. In children's hostels reconstituted skim milk or butter milk, costing about one-third the price of fresh whole milk, may be recommended as a valuable addition to the diet.

SUMMARY

1. Stomatitis was observed in two residential hostels for school children in which the diet supplied was deficient in various food factors.

2. The condition was found to be rapidly curable by daily doses of 1.0 oz. of dried yeast, unheated or autoclaved, or of 1.5 oz. of skim milk powder, cod-liver oil being without effect. It is assumed that it is due to deficiency of one or more of the factors in the vitamin-B_2 complex. The general condition of the children was greatly improved by the consumption of yeast and skim milk, particularly the latter.

3. The ætiology of the condition, in relation to pellagra and the various constituents of the vitamin-B_2 complex, is discussed.

Reviews

MODERN TREATMENT OF DISEASES OF THE RESPIRATORY SYSTEM.—By A. L. Punch, M.B., M.R.C.P., and F. A. Knott, M.D., M.R.C.P., D.P.H. 1936. J. and A. Churchill Limited, London. Pp. viii plus 295, with 96 plates and 31 text-figures. Price, 15s.

THIS is a book that will 'grow' on the reader whether he be a reviewer or just a seeker after up-to-date information. By this it is not meant that the first chapters are disappointing—on the contrary they are amongst the best, but as one goes through its pages, one realizes more and more that this book does supply

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something that other textbooks have failed to supply. Emphasis is laid on treatment but of course diagnosis is not entirely ignored and the result is a very nicely-balanced presentation of the subject.

The book is a highly practical one, a fact which is very well brought out in the first few pages on the prevention and treatment of the common cold. The chapter on that extremely difficult subject asthma is also one that will appeal to the practitioner. A criticism that might be made is that the reader is not given much help for distinguishing the allergic type from the non-allergic, or perhaps one should say the 'less allergic'. A very timely warning is given against being misled, in the search for septic foci, by conditions which are themselves secondary to the allergic manifestations and which disappear completely if the patient can be relieved, even by palliative means, for a week or so.

A very useful feature is the excellent description given to technique of treatment procedures, such as the production of artificial pneumothorax, and important diagnostic methods, such as the typing of pneumococci; the immediate direct method is naturally the only one described.

There are many prescriptions given throughout the book and we are pleased to see that the authors have given the pharmacopœial names in full; abbreviations that are quite justifiable in the written prescriptions are disfiguring to the printed page. The authors have provided a very good selection of skiagrams and the publishers have reproduced these both well and lavishly.

The student, practitioner, and specialist alike will find the book a very valuable addition to his library.

L. E. N.

TEXTBOOK OF MEDICINE.—By Various Authors. Edited by J. J. Conybeare, M.C., M.D. (Oxon.), F.R.C.P. Third Edition. 1936. E. and S. Livingstone, Edinburgh. Pp. xix plus 1027. Illustrated. Obtainable from Messrs. Butterworth and Company (India), Limited (Publishers), Calcutta. Price, Rs. 14

THE object of this book is stated by the editor to be to provide '..... The essentials of medicine within as small a compass and as low a price as possible.....'. It is felt that the word essentials would be a better word in the title than 'textbook', for such an abbreviated and condensed publication is hardly worthy of the latter term.

The reviewer has studied the book particularly with reference to its possible use to students and practitioners in India and as a result has several criticisms to offer. In the section headed 'Skin granulomata' leishmaniasis, leprosy, yaws and mycetoma are mentioned but that very important condition granuloma inguinale is not included, and mycetoma is hardly a true granuloma.

The only treatment given for tapeworm is the old two days' starvation followed by a dose of filix mas and it is said if the head is not found treatment must be repeated. It has been known for a long time that many cases are cured without the head being found so it is better to wait for recurrence of passage of segments before subjecting the patient to a tedious and objectionable treatment a second time.

For ascaris, santonin is the only drug mentioned and 'with adults, doses up to 2 gr. may be taken safely'. This sentence would be considerably improved if the words 'and with probably little effect on the worms' were added to it.

Hookworm may be treated with thymol, oil of chenopodium and carbon tetrachloride. The much safer tetrachlorethylene is not mentioned, and the concluding sentence of this section is really dangerous for it says 'often prolonged treatment with all three drugs is necessary before the disease is completely eliminated'. Not a word of caution is added about the necessary interval that must elapse between doses of these highly toxic drugs to avoid serious accidents, particularly in the case of carbon tetrachloride.

Many other instances can be found in the special sections of similar inadequate or misleading statements, but it is considered enough has been said to show the shortcomings of the book from the tropical practitioner's point of view.

One does not wish to appear hypercritical of what is a real attempt to provide a small and useful book. Many of the apparent mistakes and misinformation are no doubt caused by the necessity of rigid pruning and the utmost condensation possible, so as to keep the book within the prescribed limits.

Under the circumstances many essential points have to be omitted purely for want of space. In other words it is the reviewer's opinion that no matter how skilful the authors may be it is not possible to cover adequately all that is necessary to know about medicine in just over one thousand pages. This includes common skin diseases in under fifty pages. The number of small books purporting to be complete symposia of medicine but falling far short in their avowed object is nowadays very large, in the reviewer's opinion far too large, and at least as far as tropical practitioners are concerned, the book under review must be placed among the unwanted class, because even at the remarkably low price of 14 rupees it cannot be recommended for use in tropical practice.

KIDNEY PAIN: ITS CAUSATION AND TREATMENT. —By J. L. Jona, D.Sc. (Adel.), M.D. (Melb.), M.S. (Adel.), F.R.A.C.S., M.C.O.G. 1937. J. and A. Churchill, Limited, London. Pp. vii plus 94. Illustrated. Price, 7s. 6d.

THIS is a short but interesting and valuable publication.

It is an excellent example of how experimental methods may be combined with clinical observation and this is driven home to the reader by the citation of an actual case to illustrate each variety of pain causation discussed. The book is limited in scope and for that reason will probably not attract a great number of buyers among the practising part of the profession, who as a rule want more for their money. A great deal can be learnt from it, however, and it will well repay the study of general practitioners because kidney pain is a common and baffling condition and in this book much can be learnt about it; one of the most valuable teachings being how often kidney pain is caused not by disease of the kidney but by dysfunction brought about as a reflex from other diseased organs. Unfortunately the average practitioner will find difficulty in personally applying the diagnostic methods described because they need a good *x*-ray plant, special apparatus and considerable technical skill.

The book is copiously and well illustrated and there is a full bibliography. The printing, binding, paper, etc., are of the usual high standard one associates with the house of Churchill.

P. A. M.

THE OPERATIONS OF SURGERY.—By R. P. Rowlands, M.S. (Lond.), F.R.C.S. (Eng.), and Philip Turner, B.Sc., M.S. (Lond.), F.R.C.S. (Eng.). 1937. Eighth Edition. Volume II. The Abdomen. J. and A. Churchill Limited, London. Pp. ix plus 998, with 514 Illustrations (four in colour). Price, 36s.

THE second volume of the eighth edition of Rowlands and Turner's *Operations of Surgery* has now been published. In the capable hands of these worthy editors this book has more than maintained its reputation. By the untimely death of R. P. Rowlands, British

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surgery has indeed suffered a great loss, but, with the help of his colleague at Guy's Hospital, the whole book has been carefully revised, and a great deal has been rewritten.

As in the past, the present volume gives such detailed accounts of the operations of surgery as would be of real assistance to surgeons recently appointed to responsible positions, and to candidates for the higher examinations in surgery. The book has also succeeded in offering a fair criticism of newer methods that seem worthy of trial, especially those which stimulate thought and suggest the possibility of further researches. The new chapter on 'Some Recent Developments', at the end of the present volume, will be found both useful and interesting.

The chapters on abdominal surgery are adequate and up to date. Mr. W. H. Ogilvie has been in charge of several chapters, including those on the surgery of the spleen, pancreas, and the rectum. Gastric lavage and Ryle's tube have been mentioned in connection with persistent post-operative vomiting and acute dilatation of the stomach, but there is no mention of Wagensteen's suction apparatus. During recent years, the treatment of appendicitis has been fairly crystallized. The statement that 'when the cause of peritonitis is uncertain it is wise to use a right paramedian incision, otherwise the McBurney incision is the best', may be disputed. The first part of the statement might be generally acceptable, but, with regard to the latter, surgical opinion is bound to be divergent. In general, the former incision may be regarded as the incision of choice, in case of appendicitis, and in particular in the female subject.

Several chapters on urological surgery have been written by Mr. A. Ralph Thompson. Harris's suprapubic prostatectomy has been fully described. Suprapubic cystotomy has been recommended in the great majority of cases of ruptured urethra. In case of carcinoma, extirpation of the lymphatic glands has been recommended along with the amputation of the penis. There is no mention of Morson's views.

Gynæcological surgery has been dealt with by Dr. G. F. Gibberd. Wertheim's operation has been described in detail, but the modern revolt against such a mutilating and severe operation has not been emphasized. Vaginal hysterectomy has been rightly omitted. The section on thoracic surgery has been written by Mr. R. C. Brock.

These few criticisms are not meant to minimise or detract from the excellence of a standard compendium like the present volume. These will rather help to prove that this book is still indispensable to the practising surgeon and the post-graduate student. The printing, illustrations, and get-up are first rate. An adequate index is also appended.

P. N. R.

A TEXTBOOK OF PHYSIOLOGY.—By William H. Howell, Ph.D., M.D., Sc.D., LL.D. Thirteenth Edition. 1937. W. B. Saunders Company, Limited, Philadelphia and London. Pp. 1150, with 305 Illustrations. Price, 30s.

THE reviewer feels it would be an impertinence on his part to recommend a book that has reached its thirteenth edition at the hands of its original author, who is one of the most renowned physiologists in the United States.

On account of the rapid advances in physiological science textbooks on the subject have to be revised at fairly short intervals to keep them abreast of the changes. In this revision it is important that the author should have a ripe experience so that he will know what to include of the new work, and what to ignore as likely to be of only temporary value, also certain theories that have held the floor perhaps for years but have outlived their usefulness must be discarded or modified on account of recent work disproving them. This publication is fortunate in its author in this respect and the present edition maintains the high standard of its predecessors.

Although it is a heavy book it is well bound with a flexible back so that it need not be kept on a table when being read, because no matter how far it is opened there is no danger of the binding giving way.

P. A. M.

DISEASES OF THE VENOUS SYSTEM: THEIR ÆTIOLOGY AND TREATMENT BY INJECTION. SPA METHODS, THEIR INDICATIONS.—By P. K. Murphy, M.A., M.D., B.Ch., B.A.O. (T.C. Dub.). 1937. Henry Kimpton, London. Pp. vii plus 103. Price, 5s.

THIS small book is devoted to varicose veins and hæmorrhoids and their treatment, principally by injection.

It is a carelessly constructed book and the author has the habit of saying the same thing over and over again. If it had been carefully edited and the repetitions and redundancies deleted the subject-matter of real value would only occupy the space of an average-length paper in a medical journal.

On p. 26, line 2, there is an unfortunate error where 'If an obstruction is present.....' should obviously read 'If no obstruction is present.....' to make any sense of the paragraph. The want of care is also well exemplified where biniodide of mercury appears in the space of a few lines as Bi-iodure of Mercury, Bi-iodure de H, and biniodide of Hg. The first two renderings are apparently used because the prescription in which it is given is taken from the French.

In discussing spa treatment the author places Bagnoles-de-l'Orne in Normandy first and mentions two or three other French spas, and he ends the paragraph with a sentence 'A modified form of the "Bagnoles" treatment is, I believe, now being employed at British spas'. If he had followed up his belief and so given definite information as to which British spas could be recommended this section would have been of more use to the average British practitioner.

It is true the author does not claim it to be a book for teaching but rather as an expression of his views and experience together with a summary of current opinion. It would have had a better prospect of achieving its object if the facts had been marshalled in a more orderly manner.

HISTORICAL NOTES ON PSYCHIATRY. (EARLY TIMES—END OF SIXTEENTH CENTURY).—By J. R. Whitwell, M.B. 1936. H. K. Lewis and Company, Limited, London. Pp. xii plus 252. Price, 10s. 6d.

DR. WHITWELL'S book will be read by all interested in the history of the evolution of psychiatry with much interest, albeit the story does little credit to the intelligence of doctors in by-gone times, who clung so tenaciously to the view that mental disorder was either due to a visitation of God or the devil, or to some disturbance of bodily 'humours'. Only one voice of protest against these ignoble views is recorded, namely, that of Vincent de Paul (1576–1660), the wise and humane Frenchman, founder of numberless charitable organizations, among which was a mental hospital at St. Lazare. He was canonised by Pope Clement XII in 1737. An interesting feature of the book is a collection of chronological data of significance to the history of psychiatry. From this it appears that the first historical record of definite institutions for the mentally afflicted is to be found in the writings of Kuan Tzu who lived in the twelfth century B.C. No further record exists until A.D. 300 when a morotrophium (mental hospital) was built at Byzantium. In A.D. 491

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a mental hospital was founded in Jerusalem. It is interesting to note that in the fifteenth century A.D. Spain led the world in providing accommodation for the insane. Indian readers will appreciate the number of references to eminent Indian medical sages, such as Charaka, Susruta and Vagbhata (we presume Dr. Whitwell means Banbhatta). It would appear that the introduction of mental hospitals in India was the work of the East India Company, the first of which was founded early in the eighteenth century by Assistant Surgeon Conolly, a name later to become famous in the same department of therapeutics in the person of Dr. John Conolly (1794–1866), the humane superintendent of the lunatic asylum at Hanwell, who adopted the principles of Pinel. What records exist of the Madras mental hospital show that its founder was immensely ahead of his time in the ideas he entertained on the subject of psychotherapy.

DIAGNOSIS OF SOME DELUSIONAL INSANITY TYPES IN GENERAL PRACTICE: SCHIZOPHRENIA—DEMENTIA PRÆCOX—PARANOIDAL GROUPS: A SUMMARY OF IMPORTANT DIAGNOSTIC POINTS.—By E. Hopewell-Ash, M.D. (Lond.). 1936. Published by John Bale, Sons and Danielsson, Limited, London. Pp. 64. Price, 2s. 6d.

DR. HOPEWELL-ASH is a well-known author of a series of small yet valuable treatises on mental disorders, particularly in regard to their early symptoms. The latest of this series is extremely well written and should be of the greatest service for the type of medical man for whom it is intended, *i.e.*, the general practitioner. It is rather lamentable that what Dr. Hopewell-Ash has to say about the inadequacy of instruction to medical students in psychiatry is as true to-day as it was thirty years ago. The diagnostic points dwelt on by Dr. Hopewell-Ash are illustrated by a selection of admirable case histories.

O. B-H.

A TEXTBOOK OF MEDICAL JURISPRUDENCE AND TOXICOLOGY.—By Rai Bahadur J. P. Modi, L.R.C.P. & S. (Edin.), L.R.F.P.S. (Glasgow). Fifth Edition. 1936. Butterworth and Company (India), Limited, Calcutta. Pp. 823 plus cx with 1 coloured plate and 139 illustrations in the text. Price, Rs. 15

THE present edition of this book has, obviously, gone beyond the optimum in utility. An attempt has been made by a single author at a comprehensive treatise. Under all the old items additional facts and details have been amassed while recent advances have hardly been touched upon.

There is little or nothing said about the General Medical Council of India, the Provincial Medical Councils of India, and the employer's responsibility to the employee.

The section of bloodstains and blood groups is not only defective but also misleading. The serological test for determining the source of blood, as usually performed, is a ring test and not a turbidity test. Bernstein's theory of inheritance of blood groups deals with offspring of group A and group B, and also with offspring of group O and group AB. The combinations, group AB parent with group O child, and the group O parent with group AB child are not possible.

The myth of ptomaine is still with us. On the subject of toxicology a general remark on most books on the subject may be made here: *Cannabis Sativa* and *Strychnos Nux Vomica* are unusually well illustrated but no useful information is given on poisonous mushrooms. Nearly every medical student knows all about the former before commencing toxicology but very few medical men know anything at all about the latter even after qualifying.

The treatment of snake-bite by Calmette's serum is out of date. A combined serum against cobra and viper has been manufactured at Kasauli for over 20 years. In 1934 this serum was refined and concentrated.

The list of books recommended at the end leaves out many recent publications.

Even if all the points raised above were attended to, there would still be left a want, felt by the practitioner and the student alike, which was so suitably supplied by the earlier editions of Dr. Modi's book.

When all is said and done, however, one would not like to be without a copy of the latest edition of a book by a pioneer in the field of forensic medicine in India. His personal experiences and observations, and his collection of cases no medical man with forensic responsibilities could afford to leave unread.

The paper, the printing and the binding are good. No printer's errors arrest attention.

ELEMENTARY PATHOLOGY: AN INTRODUCTION TO THE PROCESS OF DISEASE.—By Keith S. Thomson, M.R.C.S. 1936. H. K. Lewis and Company, Limited, London. Pp. vii plus 74, with 32 illustrations of which 3 are in colour. Price, 10s. 6d.

THIS is a somewhat curious little book which was intended to be a concise note-book for medical, dental and other students to give them a brief idea of the subject before they attend their lectures and practical classes. It is no doubt a novel and ingenious idea on which the author may be congratulated. Blank pages have been put in so that students may draw diagrams from what they actually see in the practical class. A short description of the various pathological processes has been appended.

The title of the book is most unfortunate and very misleading. To be more precise, it is nothing more than an improvised practical note-book. Although the author does not desire it, the book really tends to be an unusually short synopsis of elementary pathology. The illustrations, though well executed, are neither convincing nor appropriate, and, excepting a few, they have obviously been drawn from bad material. Mistakes have crept in even in the description of some of the figures. For instance, in fig. 23, 'colony of actinomycosis' is a bad expression. On the whole, the book cannot be commended to students of pathology in its present form. Considering its position as a practical note-book, the cost is too high. Perhaps the omission of the coloured plate of hypernephroma of the kidney and the substitution of a similar plate of organizing pericarditis and replacing the latter by a half-tone block of granulation tissue might help to reduce the cost of production very materially.

The book is however very attractive and for this, it owes its indebtedness to the excellent work by the publishers.

M. N. D.

WHAT IS WRONG WITH BRITISH DIET? BEING AN EXPOSITION OF THE FACTORS RESPONSIBLE FOR THE UNDERSIZED JAWS AND APPALLING PREVALENCE OF DENTAL DISEASE AMONG BRITISH PEOPLES.—By H. Campbell, M.D. 1936. William Heinemann (Medical Books) Limited, London. Pp. xiv plus 253. Illustrated. Price, 10s. 6d.

THE somewhat oratorical title along with the cover with which this book is endowed might tend somewhat to discourage a conscientious seeker after an ideal diet, but a perusal of its pages, which can be lightly read, justifies nevertheless serious attention. A certain

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QUININE AS A PROPHYLACTIC AGAINST INFLUENZA

(BUREAU FOR PROPAGATING THE USE OF QUININE, AMSTERDAM-W., HOLLAND)

The requirements for a medical prophylaxis against influenza are laid down by Prof. *Spitta*[1] as follows:

It has to be: (1) active, (2) neither harmful nor disagreeable, (3) its administration should be easily and quickly possible by anybody without assistance, (4) cheap, and (5) it has to be carried out regularly.

QUININE MEETS ALL FIVE REQUIREMENTS according to Prof. Dr. *W. Berger* and *H. Schnetz*[2]. The following statements and references, which are all based on practical experiments, may be mentioned for illustration:—

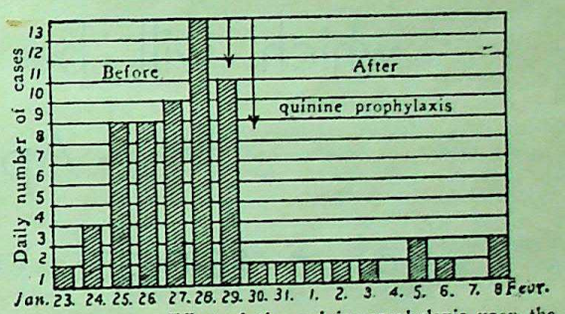
"In my opinion quinine in small, repeated doses, represents first and last the most reliable prophylactic against influenza". *Rabow*[3].

"Quinine has proved its value as a prophylactic against influenza and has produced very definite effects", is the opinion of Prof. *Laubenheimer*[4], who stated in 1918 that in a war prisoners camp one section of 1,000 men remained almost entirely free from influenza owing to the fact that they were given 0.25 gram (4 grains) of quinine daily, whereas in 9 neighbouring sections, in which no quinine had been given, there was a serious outbreak of influenza.

Arthur MacDonald[5] reported in 1929 on observations made by him in a large public school and in a girls' school in England that in both cases those who had been treated with 2 grains (0.130 gram) of quinine as a preventative remained almost entirely free from influenza, whereas those who did not participate in the prophylactic course became seriously infected. *Berger, Seemayer* and *Schnetz*[2] have demonstrated very clearly in a diagram the success of medical prophylaxis against influenza with 173 active nurses, who received daily 0.25 gram (4 grains) of quinine hydrochloride and sodium salicylate aa, or quinine bisalicylo-salicylate. Whereas, in the last week of January during the influenza epidemic in Graz, Austria, 1933, the cases of influenza of the nursing staff increased continuously, parallel with the influenza-patients admitted to the clinic, the 10 to 13 new daily infections amongst the nursing staff suddenly fell with the beginning of the influenza-prophylaxis, to one case daily, and this reduction undoubtedly occurred long before any general decline of increase of the cases of influenza. Prior to the influenza-prophylaxis 21.6 per cent. of the nurses became infected, after the beginning of the quinine-prophylaxis only 4.8 per cent.

Professor *Spitta*[1] of Berlin, who himself was extraordinarily easily infected by influenza, published in 1933 an article in which he recommends a regular dosage of 0.05 gram (1 grain) of quinine, as a prophylactic during the influenza months of December, January, February and the beginning of March. Owing to this measure, he himself and his immediate circle had remained free from influenza for 15 years, during which period severe influenza epidemics had occurred.

Basing herself on the favourable results of her earlier experiments, Dr. *Anna Oetiker*[6] administered in 1935 at the approach of an influenza epidemic a daily dose of 0.05 gram (1 grain) of quinine as a preventative to 125 persons of an educational institution; the result was that at the outbreak of the epidemic, those who had taken quinine for seven days remained unaffected, whereas a few persons, who had been infected before the beginning of the quinine administration, were only slightly affected.



Effect of the quinine-prophylaxis upon the daily new-infections with 173 nurses.

(*Therap. d. Gegenw.*, 76: Nr. 11, Nov. 1935.)

Besides the above-mentioned practitioners, a great number of others[7] have expressed themselves favourably on the value of quinine as a preventative of influenza.

The statement of *Ceconi* and *Vico*[8], that sufferers from malaria who have undergone treatment with quinine, are generally very slightly affected by influenza, may be regarded as a confirmation of this opinion.

The dosages administered may vary according to circumstances.

Although from the literature mentioned herein a daily dosage of 3 grains (0.200 gram) of quinine may be taken as a generally satisfactory safeguard against an outbreak of influenza, the doctor's opinion must always be taken as final according to the condition of the patient and other circumstances.

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number of pages is devoted to the functions and nature of a complete diet from its nutritional point of view, namely, proteins, fats, vitamins, etc. A diet, however adequately equipped in its chemical make up, may yet be lacking in certain qualities necessary—to use a narrower term—for proper alimentation.

The author rightly stresses the importance of the physical texture of a diet. An adequate amount of roughage is, as is well known, necessary for the normal functioning of the alimentary canal, but the question of the toughness or softness of a diet on the normal development of the jaws and teeth has hitherto received scant attention; lack of proper mandibular exercise is held to be largely responsible for ill-formed jaws and overcrowding of teeth which one sees so often in the streets nowadays. Further, a food with a texture such as apples has a more favourable effect on oral and dental hygiene than the more pultaceous cooked foods. The author adduces a number of interesting facts and observations about malformed jaws but we feel from observation in India that the precise rôle of texture and nutritional value of the diet along with postnatal care has yet to be evaluated.

The book is well written and along with its illustrations should encourage many who are interested in diet on account of its slimming possibilities to realize that there may be other and more important æsthetic qualities to be hoped for from the art and science of nutrition.

MIND, MEDICINE AND METAPHYSICS: THE PHILOSOPHY OF A PHYSICIAN.—By William Brown, D.M. (Oxon.), D.Sc. (Lond.), F.R.C.P. 1936. Humphrey Milford, Oxford University Press, London. Pp. vii plus 294. Price, 7s. 6d. Obtainable from Oxford University Press, Bombay, India

THIS small book is a collection of addresses and essays by a well-known medical psychologist in which his views on various aspects of psychopathology and allied subjects are enunciated. Among other matters there is a dogmatic statement on the basis of psychology as to what the League of Nations should be and why it has failed in its objects up to the present.

It is a book that might be of interest to the practising general physician as a means of widening his knowledge in this special branch of medicine, but it is not sufficiently detailed to be of real value to one wishing to take up the subject of psychoanalysis as an aid in his daily practice.

SCALPEL AND SWORD.—By Sir James Elliott. 1936. Angus and Robertson Limited, Australia (89, Castlereagh Street, Sydney). Pp. 215. Price, 7s. 6d. (Obtainable in London from The Australian Book Company, 37, Great Russell Street, W.C.1)

UNDER the above title the author gives his personal experiences and reminiscences from the time of his arrival in New Zealand as a small boy until recent years.

These include description of the life of a medical student in Edinburgh, experiences in practice in New Zealand, and a certain amount of war service—in the South African war on a field hospital staff, and in the Great War in charge of a hospital ship. Interspersed throughout these personal anecdotes there are sketches of life in New Zealand and descriptions of much of the wonderful scenery in these islands.

It is a book that will be mainly of local interest but it will no doubt also appeal to that fairly large section of British readers who devour books on biography, travel and descriptions of countries other than their own.

P. A. M.

AGGRESSIVE MEDICINE.—By John Maberly, M.R.C.S. (Eng.), L.R.C.P. (Lond.). 1935. Baillière, Tindall and Cox, London. Pp. viii plus 232. Price, 10s. 6d.

THIS book with the attractive and startling title of *Aggressive Medicine* contains an account of the therapeutic uses and value of three drugs—iodized tincture of guaiacol, tincture guaiacol-chlor-iodide and tincture mansonia ovata, prepared by the British Drug Houses Limited, London. The conclusions finally reached by the author, who has used them on a number of his cases, are (1) that the iodized tincture of guaiacol is selective as regards serous membrane and fluids and is destructive to Gram-positive organisms, (2) that the tincture guaiacol-chlor-iodide is selective as regards blood and tissues other than of the serous type and is destructive to Gram-positive cocci, and (3) that tincture mansonia has specific action on Gram-negative diplococci such as *Neisseria catarrhalis*. He has used these drugs in a large variety of infectious diseases and has found them to be valuable 'internal antiseptics'. Meningitis, poliomyelitis, neuro-syphilis, pneumonia, bronchitis, pleurisy, synovitis, peritonitis, puerperal sepsis and other acute infections have all been cured by the use of these drugs. The dose of all of them is half to 1 dram twice a day. They act best when combined and bring about complete sterilization from infection. Brief histories of the cases treated by the author and results obtained are also given.

On reading the book one is apt to get the impression that the efficacy of these drugs is almost on a par with that of quinine in malaria and of arseno-benzene compounds in syphilis. It is no doubt true that guaiacol compounds have been extensively used in the treatment of some of the infectious diseases referred to by the author, but unfortunately the beneficial results obtained have not always been as marked as in the hands of the author. It would therefore be rather presumptuous to assume that these drugs are valuable specifics for the treatment of infectious diseases in which they have been employed by the author with success. Unless more extensive trials are carried out under controlled conditions the true place of these drugs in the therapeutic armamentarium of the physician cannot be assessed. The book as it stands is certainly an interesting one and is stimulating to thought.

K. V. K.

WOMEN EAST AND WEST—IMPRESSIONS OF A SEX EXPERT.—By M. Hirschfeld. 1935. William Heinemann (Medical Books) Limited, London. Pp. xix plus 321. Illustrated. Price, 12s. 6d.

MAGNUS HIRSCHFELD is certainly one of the great sexologists in the world and may be ranked along with recognized experts such as Havelock Ellis, Freud and others. When he writes a book on the very fascinating subject of women it is sure to attract universal attention and is sure to be read widely. But his book 'Women East and West' is a little disappointing because the title of it is a misnomer. There is very little in it about the women of the West and there is not very much about the women of the East. It is chiefly a record of important happenings and of impressions gained by the author during his tour of Japan, the Philippines, China, Dutch East Indies, India, Egypt and Palestine.

He tells us of the people he met, the lectures he delivered and the scenes he saw; here and there, as though to spice the narrative he makes a few observations regarding the women of these countries from the point of view of the sexologist and makes passing references to subjects such as marriage customs, sex life, prostitution and so on. Although there is nothing in the book that can be said to be of particular interest to the medical profession yet the lucid way in which he narrates the many events that took place and the

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interpretations he gives to the many interesting observations that he made, makes the book very fascinating. It is therefore recommended as an excellent book for light reading during leisure hours, not particularly to the medical profession, but to the general public at large.

K. V. K.

OTHER BOOK RECEIVED

Mind and Vision: A Handbook for the Cure of Imperfect Sight without Glasses. By R. S. Agrawal, L.S.M.F. 1935. Published by the Author. Dr. Agrawal's Eye Institute, Delhi. Pp. viii plus 182. Illustrated. Price, Rs. 4.

Abstracts from Reports

REPORT ON THE ADMINISTRATION OF THE EXCISE DEPARTMENT IN THE PROVINCE OF BIHAR AND ORISSA FOR THE YEAR 1935-36

Ganja.—Nine licenses were issued for the cultivation of *ganja* during the year 1935-36, the same number as in the previous year. The total area under *ganja* cultivation during the year was 133 acres which produced 696 maunds of flat *ganja* and 206 maunds of the round variety and is expected to be sufficient to meet the demand of the provinces of Bihar and Orissa during the year 1936-37.

The total quantity of *ganja* issued on payment of duty was 36,117 seers against 35,757 seers in 1934-35. Consumption increased in nine districts and decreased in 12 but the fluctuation was not large in any district except in Purnea and Patna. The increase of 309 seers in Purnea was due to the slight improvement in the jute trade.

The Cooch Bihar system of supply.—Ganja continued to be exported to the Orissa State free of duty (other than Bonai, Gangpur, Kharsawan and Seraikella which took their supplies as usual from Sambalpur and Singhbhum on payment of duty) under what is known as the Cooch Bihar system of supply. The essential features of this system are that the State undertake to enforce complete prohibition of the cultivation of hemp plant, and also, the sale and possession within their territories of all *ganja* other than that obtained from the British warehouse, to co-operate with Government in all measures for the suppression of smuggling and illicit cultivation of *ganja* and to enforce the same rates of duty as are in force in the neighbouring British districts in return for which they are supplied with *ganja* duty free from *golas* in the British districts.

Bhang.—The contract for the exclusive privilege of collection, storage and wholesale supply of *bhang* in the province continued with Babu Lachman Prasad Chaudhury. During the year he collected 543 maunds of *bhang* in the district of Purnea and the whole quantity was stored in the central *gola* at Bhagalpur which had a previous balance of 84 maunds 35 seers 4 chittacks. The drug was supplied from the central *gola* to the warehouses of this province as well as to the provinces of Bengal and Assam. The quantity of *bhang* issued under bond to wholesale dealers of this province was 261 maunds 20 seers against 181 maunds and 20 seers of the preceding year, while 225 maunds were exported under bond to Bengal against 250 maunds of the previous year. Twenty-eight seers of the drug were exported to the province of Assam on payment of duty in that province against 1 maund and 13 seers of the preceding year.

The total quantity of *bhang* issued on payment of duty to retail vendors of the province during the year was 9,216 seers against 6,977 seers in the preceding year. Consumption increased in all districts except Shahabad and Darbhanga. Remarkable increases took place in the districts of Gaya (284 seers), Cuttack (552 seers), Puri (297 seers), Ranchi (125 seers), Palamau (107 seers), Manbhum (352 seers) and Singhbhum (241 seers). Increase in these districts was chiefly due to reduction in the retail price of *bhang* and on account of vigilance of the excise officers on the smugglers of non-duty-paid *bhang*. The decrease in Shahabad and Darbhanga was nominal. The incidence of consumption per thousand of population was 3.9 chittacks against 2.9 chittacks in the preceding year.

Opium.—The total quantity of opium issued during the year to shops within the province was 20,826 seers against 20,086 seers in 1934-35. Consumption increased in 11 districts and decreased in 10. The increase was large in the districts of Balasore (306 seers), (Puri (237 seers), Cuttack (186 seers) and Angul (36 seers) and was due to competition amongst vendors and to the slight improvement in the economic condition of the people in the Balasore district. The decrease in consumption was not marked in any district.

The practice of administering opium to children prevails to some extent in the districts of Cuttack, Balasore, Puri, Sambalpur, Hazaribagh, Ranchi and Palamau. Excise officers continued to explain the evil effects of the practice to the people found purchasing opium for children. Its evil effects were mentioned to students during lectures on hygiene by the school medical officer of Cuttack, and by the health staff of the Balasore District Board. In Puri, the officers of the District Board, the Municipality, the Education and the Public Health Departments did some propaganda work in this connection. Similar work was done in the district of Hazaribagh by the officers of the District Board and Education Department. It is reported that the practice is gradually on the decrease.

The habit of smoking prepared opium prevails to a certain extent in most of the districts but it is confined to towns and important centres of trade. There is no indication of the use of morphia as a substitute for opium as an intoxicant.

Cocaine.—Twenty-four persons were prosecuted during the year under report against 34 in the preceding year. The total quantity of cocaine seized weighed four ounces against three ounces in the preceding year. Cocaine traffic prevails at Bhagalpur, Patna and to some extent at Muzaffarpur. Particular care was taken to check the illicit traffic at Bhagalpur, which is most notorious in this respect, with the result that the activities of the smugglers remained under a strict vigilance and the number of the cocaine cases fell from 19 (1934-35) to 11 in the year under review.

ANNUAL PUBLIC HEALTH REPORT OF THE PROVINCE OF ASSAM FOR THE YEAR 1935. BY LIEUT.-COLONEL T. D. MURISON, D.P.H., I.M.S., DIRECTOR OF PUBLIC HEALTH

THE STATE OF THE PUBLIC HEALTH AND THE HISTORY OF CHIEF DISEASES

THE state of public health in the province was not satisfactory during the year under report. Deaths under all heads of mortality, with the exception of

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'Injuries', were greater than in 1934. There was a severe outbreak of cholera in the Kamrup district. The largest increase in the number of deaths was from cholera, followed by an increase under fevers.

A total of 169,723 deaths was recorded during the year, of which 7,436 were from cholera, 529 from small-pox, 106,719 from fever, 10,947 from dysentery and diarrhœa, 7,022 from respiratory diseases, 2,051 from injuries and 35,019 from 'all other causes'. The death rate for the year 1935 was higher than the decennial rate by 2.12.

Cholera.—The total number of deaths reported from cholera during the year was 7,436 as compared with 1,904 in the previous year. The death rate per 1,000 of population was 0.94 against 0.24 in 1934, the decennial average being 0.89.

The districts which suffered most from cholera during the year were Kamrup, Darrang and Goalpara. Deaths from cholera were reported from 108 out of 147 registration circles and from 1,509 villages out of 28,333 in the province. The largest number of deaths (2,167) occurred in May followed by April (1,249) and June (1,080). The lowest mortality (134) was recorded in October. During the year under review, 102 deaths from cholera occurred in towns and 7,334 in rural areas.

A total of 333,534 persons was inoculated with cholera vaccine in 1935, excluding those inoculated in tea estates. A total of 1,020,481 doses of bacteriophage was issued during the year under review. Bacteriophage is being tried out in the Nowgong district and in the Habiganj subdivision of the Sylhet district. In these two areas cholera vaccine was not administered. As in past years, five mobile epidemic units, each consisting of three sub-assistant surgeons and six disinfectant carriers, were employed, *viz*, two in the Sylhet district and one in each of the districts of Goalpara, Kamrup and Nowgong. Their services are utilized throughout the province. The units in Nowgong and Habiganj are fully employed in the bacteriophage experiment, they are not therefore available for other duties. The establishment of epidemic units has been very fully justified and the provision of more such units is much overdue.

A total of 137 deaths from cholera was reported from tea estates during the year as compared with 104 deaths in the preceding year, the corresponding ratio per mille being 0.14 and 0.11 respectively.

EPIDEMIOLOGY

The number of deaths from cholera during the past eleven years was as follows:—

1925	..	6,233	1931	..	5,523
1926	..	10,275	1932	..	4,971
1927	..	15,392	1933	..	5,508
1928	..	6,915	1934	..	1,904
1929	..	7,765	1935	..	7,436
1930	..	6,332			

The increase in cholera mortality in 1935 was due to an increase of the disease in the districts of Sylhet, Goalpara, Kamrup and Darrang. The outbreak was most severe in the district of Kamrup. At first the outbreak was of a sporadic nature, but later it assumed an epidemic form partly owing to delay in reporting outbreaks and partly owing to the dryness of the weather which caused shortage and contamination of drinking water. All the available resources of the public health and medical departments were concentrated in combating this epidemic in the Kamrup district. The total number of deaths was 2,851. The epidemic of cholera in the Goalpara district which broke out in the latter part of 1934 continued till March 1935. A total of 930 persons died in the Goalpara district during the year. In the Surma Valley only sporadic cases of cholera occurred throughout the whole year. In all these districts, particularly those in the Assam Valley, cholera was imported by emigrants from the Bengal districts both by land and water. The remaining districts remained practically free from cholera and only sporadic cases occurred.

Smallpox.—The total number of deaths from small-pox during the year 1935 was 529 against 206 in the preceding year, showing an increase of 323 deaths. The death rate was 0.07 per mille compared with 0.03 in 1934 and 0.33 the decennial average.

Plague.—No case of plague was reported from any district during the year under review.

Fevers.—The total number of deaths from fevers during the year 1935 was 106,719 against 101,779 in the preceding year, showing an increase of 4,940 over that of the previous year. The death rate per mille was 13.46 during 1935 as compared with 12.84 in 1934 and 11.87 during the last decennium.

'Fevers' accounted for 62.88 per cent of the total provincial mortality against 64.51 in the preceding year. The figures include deaths due to malaria, kala-azar and also deaths from various diseases having fever as their predominant symptom. It is therefore not possible to determine what percentage of the total deaths under this head is due to malaria. The largest number of deaths (11,823) was recorded in June and the smallest (5,883) in March. As in previous years, quinine and cinchona were distributed free to indigent malaria patients throughout the province.

Dysentery and diarrhœa.—The total number of deaths registered under 'Dysentery and Diarrhœa' was 10,947 during 1935 against 8,195 in 1934. The death rate per mille of population was 1.38 during the year under review as compared with 1.03 in 1934. The decennial average was 1.16.

Respiratory diseases.—The total mortality from these diseases during the year under review was 7,022 as compared with 6,440 in 1934. The corresponding death rates for the two years were 0.89 and 0.81 respectively. The quinquennial average was 0.73. The highest mortality (703) was recorded in November and the lowest (474) in February.

Epidemic dropsy.—An outbreak of epidemic dropsy was reported from Patharkandi in Sylhet district. Dr. R. B. Lal, Professor of Vital Statistics and Epidemiology, Calcutta, and the late Dr. P. Gupta, Assistant Director of Public Health, Surma Valley and Hill Division, carried out investigations. Outbreaks of epidemic dropsy were also reported from Silchar, Karimganj and Sylhet towns. No definite factor could be traced as being responsible for the causation of the outbreaks.

Yaws.—During the year under review a total of 4,201 cases of yaws was treated against 3,089 in the preceding year. The result of treatment has been found very satisfactory. Rate of relapse is very low, but this is very common amongst those patients who do not complete a full course of treatment. A total of 1,780 cases was treated in the Goalpara district, and in Kamrup 673. The disease which was generally prevalent in the low-lying hills and in the foot hills in this district amongst Mikirs, Lalungs, Kacharis, Garos and other hill people showed a marked decrease during the year under report. Exhaustive and thorough survey is being made to bring all foci of infections under control. In the Nowgong district a total of 592 cases was treated in the public health department dispensaries as compared with 431 in the preceding year. During the year under report four new centres were opened in this district. In the Garo Hills 180 cases of yaws were treated.

Kala-azar.—The number of deaths from kala-azar during the year 1935 was larger by 75 than that of 1934.

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The number of patients treated was less by 2,298. The decrease is shared by all districts except Goalpara. The method of diagnosis and treatment of kala-azar continued to be the same as in previous years. Treatment is by means of intravenous injections of urea-stibamine. Owing to the increase in the price of neostibosan the treatment of kala-azar with this preparation was stopped in this province during the year under review. Special attention is given to intensive and detailed surveys in all districts in order to detect fresh cases and to bring them under treatment as early as possible.

Leprosy.—During the year under review, 4,926 lepers came under treatment in the leper asylums and other centres of treatment under the medical and public health departments. Three hundred and seventy-seven lepers were treated as inpatients in the Leper Asylums at Sylhet, Gauhati and Kohima and in the Leper Ward at Dhubri and the Leper Colony at Tura. One thousand two hundred and forty-four outpatients received treatment in the dispensaries under the Medical Department. A total of 2,305 lepers was treated in the Public Health Department dispensaries during 1935. The number of outdoor clinics for the treatment of leprosy during the year was 61 against 52 in 1934. The number of clinics in the medical department rose from 126 in 1934 to 138 in 1935. The Mission Leper Colony at Jorhat treated 110 lepers during the year. Nine sub-assistant surgeons of the public health department were trained locally during the year under report in the technique of leprosy treatment. Sub-assistant surgeons of this department undertake leprosy surveys in conjunction with kala-azar surveys. No special leprosy survey was undertaken during the year. The treatment although slow and tedious is becoming popular.

Malaria.—Malaria is prevalent throughout the province and almost constantly in epidemic form. A total of 733,408 cases of malaria was treated in all hospitals and dispensaries in the plains districts, *viz,* 664,920 cases were treated in dispensaries under the Medical Department and 68,488 cases were treated in Public Health Department dispensaries. Separate figures of mortality from malaria are not available, deaths from 'fevers' in 1935 amounted to 106,719 against 101,779 in the preceding year. A very large percentage of deaths under 'fever' is directly attributable to malarial fevers. Quinine-reinforced cinchona febrifuge was used as a general preventive and curative agent against the disease and was sold to the public at the cost price of annas 3.9 per treatment. Sales, on the whole, have been disappointing and in order to overcome this, Government has approved of the proposal to sell this preparation to the public in a smaller treatment form at the cost price of annas 2 per treatment. As in previous years the Government of Assam gave a grant of Rs. 25,000 to the Assam Medical Research Society for purposes of research. The society's activities are at present confined mainly to researches on malaria. These activities are summarized in the following note supplied by the Research Officer:—

'Many of the malaria surveys in hand in 1934 are now complete and, according to the findings, recommendations for the necessary anti-larval activities have been made'. Several surveys were, however, continued during the year in order to confirm findings previously made or to correlate findings with the researches being undertaken. Three new surveys, in an hyperendemic area, were undertaken to complete data necessary for the investigations in hand. The treatment centre at Doom-Dooma, for the evaluation of the use of plasmoquine in the field, was continued.

An eight weeks' course in malariology was held during July and August and twenty candidates passed the examination held at the end of the course. Entomological investigations included the identification of 152.075 anopheline larvæ, of 22,997 adult specimens and 9,348 adult anophelines dissected. Two species were found infected; 3,119 *A. minimus* and 1,046 *A. culicifacies* having sporozoite rates of 2.05 per cent and 0.38 per cent respectively, and the oöcyst rate of *A. minimus* was 3.21 per cent. *A. culicifacies* specimens found infected were from Lumding only. This species has not been previously reported as a carrier in Assam. Examinations of 16,972 blood slides, principally from hyperendemic areas, were made and in 6,899, or 40.66 per cent of these, malaria parasites were found. Data of 69,563 blood examinations have been completed from healthy, moderately endemic and hyperendemic areas in Assam. These data are being studied and a report is in course of preparation. Breeding experiments undertaken in the northernmost and coldest part of Assam have shown that under the coldest conditions present in the winter months, the adult of *A. minimus,* the principal vector of malaria, continues to emerge. With minimum temperatures averaging 54°F., the period required from the egg stage, through the larval and pupal stage to adult emergence averages 30 days. With increasing temperatures in April and May this developmental cycle from the egg to the adult emergence was reduced to 16 to 17 days and 12 to 13 days respectively. Other breeding experiments have shown that at least three batches of eggs can be fertilized by the spermatozoa retained in the spermatheca of *A. minimus* after primary matings, and that eggs of *A. minimus* are fertilized by the spermatozoa in the common oviduct during the act of oviposition.

Researches on malaria in Assam with special reference to cold weather and pre-monsoon anti-larval control have shown that the suitability of breeding conditions of *A. minimus,* the significant vector of malaria in Assam, falls into three separate groups which have been defined. The study of the malaria problem in two of these group areas shows that breeding of *A. minimus,* during the period January to mid-June, is the responsible factor for the increase in the malaria case incidence in moderately endemic areas and that, in the hyperendemic areas, breeding during this period is conducive to the rapid geometric progression in numbers of adults so that when rains breeding places are made available, breeding is transferred to these rains breeding places and continues until late November. The application of antilarval activities in the moderately endemic areas during the period early January to mid-June (*i.e.,* until nature, by flushing, assumes control of stream breeding places of *A. minimus*) may be more economical than the present advocated period of anti-larval control (15th March to 15th November) as, during the former period, much smaller water areas would have to be controlled, with the habitat of the vector concentrated. Breeding would be stopped at its lowest point in the cold weather, and pre-monsoon months, preventing not only the subsequent geometric increase in the numbers of the vector when meteorological conditions become more favourable, but, in the absence of mature adults in April, May and June, would prevent the rise in malaria case incidence resulting from active transmission during this period. Malaria control, instituted on these lines and under expert supervision in three experimental centres (two moderately endemic and one hyperendemic), has shown, during one year, a parasite index reduction of approximately 50 per cent and spleen index reduction of approximately 25 per cent. Malaria control measures in these experimental control centres are being continued. Two other towns and also two groups of villages which have been surveyed are, during 1936-37, to be included in the experimental group. The bulk of the malariogenic areas in Assam, particularly in the case of villages, comes under the classification of 'moderately endemic'. Often a single small stream is the responsible breeding habitat: therefore, if our researches prove that we can control malaria by the application of antilarval measures to the small perennial streams during the cold weather and pre-monsoon months, it will become economically possible to protect from malaria the bulk of the villagers in Assam. A lump provision of Rs. 24,500 was made by Government for the purpose of carrying out anti-malaria measures in the province.

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SEVENTY-FOURTH ANNUAL REPORT OF THE GOVERNMENT CINCHONA PLANTATIONS AND FACTORY IN BENGAL FOR THE YEAR 1935-36

THE market for quinine and cinchona has again remained remarkably steady throughout the year with the price showing little more than fractional variations due to differences in exchange. Demand is maintained, but except in India it falls far behind current supplies while the gulf which separates supply and potential demand is as wide as ever. The condition is chronic: it will probably not be righted until the fight against malaria is viewed throughout the world as a social service entitled to finance from Governments, from employers and generally from the enlightened section of the world's population. While education and a rising standard of living must have their effect in bringing malaria under control, nothing short of active State participation is ever likely to make much headway against the appalling suffering and loss of life that goes steadily on. In India, more than elsewhere, this truth may be said to be recognized and more than elsewhere it requires to be recognized, for we have the unenviable distinction of harbouring some of the world's worst malarial infection centres.

The difficulties that beset a wider and more efficacious Indian distribution of the drug are, however, not decreased at a time when constitutional changes are pending and when the future duty of growing and distributing quinine has still to be apportioned between the Central and Provincial Governments. It is, however, a happy sign that public opinion shows an increasing interest in this subject, for it is ultimately through the public conscience acting directly in public institutions or in the Government of the country that a solution of the quinine problem can be reached. It appears, however, from the trend of discussion in the legislature and in the press that the public are not so conversant with all aspects of the quinine problem as to make its interest practically effective. Its usual demand up till now has been for more and more and cheaper and cheaper quinine. It knows the remedy and it sees the ravages from malaria that go on. But there are practical difficulties in the way of all attempts to bring quinine at low rates to the great mass of India's sufferers. The general public cannot be expected to be aware of these and it may not be out of place here to refer to one, and what is probably the greatest, difficulty. The present high level of prices in cinchona products is essentially due to the difficulties of production. If the raw material were easy of production the manufacture of sufficient supplies of quinine would be easy enough, but cinchona as a plant is exacting in its demand and it is not everywhere or under any set of conditions that it can be successfully exploited. Costs of production are high, competition is restricted by reason of the climatic and soil requirements of cinchona and these combined explain high world prices.

The misfortune of these conditions was clearly recognized by the Health Committee of the League of Nations when they came to examine the question of the cheapening of quinine for the poorer malaria patient. The public demand for the lowering of quinine prices in India is obviously based on the fact that production costs here are lower than the level of world prices and Government are therefore urged repeatedly not to make a profit. The difficulty, however, is that the volume of production in India is quite insufficient to meet more than a fraction of the home demand giving the importer of quinine a virtual monopoly, and as long as this state continues so long will it be impossible for Government to reduce prices below market levels without the risk of supplies going astray into the hands of profiteers. And even if Government did take the risk their own supplies would serve but a small section of the population leaving the great bulk of national demand to be supplied by imported quinine at world prices. So far as the whole country is concerned, relief can only come from such an extension of local production as would effectively compete with foreign quinine in meeting the total demand, and thus maintain prices at a level commensurate with the cost of production at home. It is fortunate that in India areas exist fairly suitable to the cinchona plant, and experience has shown that it can be cultivated here at costs which would allow of a cheapening of quinine for the masses.

When the public recognize this fact and finance is forthcoming there is no reason why a forward cinchona policy should not be adopted with every prospect of success. Experimental cultivation could be started under suitable conditions in different parts of the country, and all the accumulated experience of the existing cinchona organizations in India would be available to draw upon. But the success of such effort, if it is to be truly national, would seem to depend on a co-ordination of all the provincial efforts. Only certain provinces in India are fortunate in having suitable areas, and with the inauguration of provincial autonomy under the new constitution it would seem that the Central Government alone could bear the responsibility of such a national policy, so that the less fortunate provinces also may benefit. For under the present economic conditions it is not likely nor is it reasonable to ask that those provinces which can produce would make revenue sacrifices in the interest of others. This was probably one of the reasons why the Royal Commission on Agriculture stressed the importance of cinchona as a national programme. Since the Commission sat one difficulty has arisen. It lies in the fact that public health tends to be decentralized while cinchona seems to be linked with public health. But the production of quinine, as apart from its distribution, would scarcely seem to come within the scope of public health, and the public interest in prices seems to indicate that a co-ordinated and combined effort at production would be welcomed. What might be achieved by the pooling of resources is exemplified by the results in Bengal as shown in the present year's report.

Mungpoo.—The year's work has been progressive and returns show an increase in acreage of 81.29 acres and nearly rupees one lakh increase in block value. Weather conditions at the time of planting extensions were ideal and the plants put out have made good growth and refilling charges will not be very high next year. Some 19,000 plants of ipecacuanha were put out under covered lines during the year and the total standing crop is now 136,400 plants: a harvest of 380 lb. dry root for the year is recorded.

Munsong.—After filling in all vacancies in the previous year's plantings a total of 147.7 acres was put out in cinchona.

Experience has now been gained to give an opinion on present planting methods. Everything points to the fact that the longer the land is fallowed after a previous cinchona crop the better the results. The putting of old blocks for two years under green manures gives much better results than land filled in without the green crops, but, on the other hand, land which has been properly afforested with forest trees, or land which has not carried a cinchona crop, such as old *khet* land, gives still better results. Two small areas planted last year on Kashyem division in such land did so well that it was not worth while to trouble to fill in vacancies this year, though it was done due to plenty of plants being available. At the moment those two small areas are equal to any of the original plantings when they were of the same age. This type of land is now unfortunately not available. So it is a question of deciding if green manuring for the short period should continue or land be put under quick growing forest for 10 to 12 years before being used again. The writer is of opinion that if new areas can be opened up elsewhere to overcome this fallowing period on Munsong the latter should be the future policy. The trees to be used to fallow the land can be specially selected for this purpose alone, in which case the period of fallowing could probably be less than that given above. Such species as Erythina and Albizzia to give humus, and Alnus to open up the soil, planted as a mixture

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would be very suitable. To discontinue planting and fallow the land with forest trees would also likely be an advantage against the nursery disease. On the other hand, should conditions be such that Munsong must continue to replant as at present it seems desirable, and would pay from a cultural point of view, to extend the period under green manures for at least one year. This can be done as the best types of green manures for the purpose have, after considerable experimental work, been decided on and raised in sufficient quantity to supply the necessary seeds. The prevalence of disease on Munsong led to a policy of retaining in growth every tree that did not show definite signs of going off, but the decision to coppice such trees a second time will have to be reversed. They are usually so scattered as to make interplanting difficult while growth on the second coppice, if this does not kill the plant outright, is far behind growth after a first coppice. Experience shows that the double shock to the plant is beyond its powers of resistance. Root bark too is lost after the second operation. Healthy cinchona will stand it once but not twice, and we shall have to modify our cropping programme accordingly. In the coming year an increased bark harvest will have to come off Munsong because of the necessary removal of doubly coppiced areas that would lose in bark increment if left longer.

The nursery disease still awaits identification and, incidentally, a cure. During the year Miss Burt of the Hardinge Medical College, Delhi, and Mr. Kheshwalla of the Agricultural Research Institute, Pusa, visited Munsong in connection with it. These investigators are still working on the problem. The disease was prevalent in some nurseries more than others, Burmiak being the worst affected. Continual opening up of new nursery sites helps considerably, but lack of water and suitable sites, apart from the question of expense, places a limit on the extent to which this can be done in any one year. This and other practical methods against it continue year by year always in the hope of a remedy being found even though the mycologists are unable to give the disease a name.

The dry bark harvest was 871,795 lb., composed of Ledgeriana 797,848 lb., Officinalis 14,662 lb., Succirubra 10,601 lb. and Hybrids 48,648 lb. The bark came from dead and dying, thinnings, and coppicings from the refilled areas. In connection with the harvest 151.3 acres have been cut off including 9.9 acres which had to be written off against block 8, Burmiak on it being completely uprooted. The quantity of bark despatched from the plantation during the year was 886,493 lb. composed of Ledgeriana 812,780 lb., Officinalis 15,025 lb., Succirubra 12,437 lb. and Hybrids 45,251 lb. Of the total of 886,493 lb. despatched 200,000 lb. were sold to the Madras Government and 3,360 lb. to a Calcutta firm for experimental purposes, leaving a balance of 683,133 lb. as the quantity handed over to the factory.

Work at the factory continued during the year on lines indicated in the last annual report. There are no major developments to note but a number of quinine salts, not hitherto prepared by us, is now being supplied regularly to meet a small demand that exists and may grow in the future.

The total bark extracted was 1,361,941 lb., a reduction of 8 per cent on the previous year. Of this bark Munsong provided 61 per cent and Mungpoo 34 per cent, while the balance of 5 per cent came from the Government of India stocks of Burma and Java bark. Munsong bark contained an average of 4.37 per cent quinine sulphate, Mungpoo bark 3.75 per cent and India bark 4.1 per cent. The products obtained were as follows:—

Source of bark		Quinine sulphate	Cinchona febrifuge
Munsong	.. ..	32,700	14,433
Mungpoo	.. ..	15,691	7,584
Burma	.. ..	1,580	494
Java	.. ..	1,055	874
TOTAL	..	51,026	23,385

Besides the quinine sulphate obtained as such and shown above a further 3,157 lb. of it was contained in the cinchona febrifuge manufactured, bringing the total of quinine sulphate recovered from bark to 54,183 lb.

Of the Bengal quinine sulphate 29,144 lb. were purified to meet current needs, the balance being left in the crude state and stored in bins. Tablets were made from 12,791 lb., which shows an increase of 23 per cent on the previous year's figure. Other quinine salts manufactured made a total of 972 lb., nearly three times the quantity made in the previous year. This has meant a considerable strain on existing resources as the factory is not properly equipped for this type of work.

Opportunity was taken this year to make a more thorough overhaul of plant and machinery than usual. Laboratory work continued at high pressure. Apart from experimental work on current problems in connection with the process, the number of analyses made during the year of bark samples and intermediates was well over twelve hundred.

Correspondence

INFANTILE BILIARY CIRRHOSIS

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I have just read an annotation, without seeing the original article, in the *Journal of Tropical Medicine and Hygiene* dated 15th December, 1936, in reference to a paper on infantile biliary cirrhosis by Dr. S. C. Lahiri in your June issue, 1936, wherein *bacterial* toxin is regarded as an important factor in the ætiology of this disease.

In the 'Transactions of the South Indian Branch of the British Medical Association', Vol. XVII (1923 or 1924), will be found a reference to a paper of mine in which it is suggested that the cause is a dietetic one resulting from the ingestion of curry stuffs and their irritant volatile oils by the pregnant mother. Such toxin is operative during intra-uterine life and continued at the breast. Many of these infants die during the first year of life.

In support of the above view is the experimental cirrhosis induced by feeding rabbits on hospital curry stuffs, which I carried out in Madras and at home. By feeding pregnant rabbits, a biliary cirrhosis is produced in the intrauterine fœtal liver. Further feeding experiments on the ingredients of curry powder were conducted without detecting the essential toxic element, although it was found that rabbits fed on green chillies for three months never 'turned a hair', while controls on curry stuffs were dead in that time, all of them from cirrhosis of the liver.

As the detail of this experimental work is not reported in the transactions and some of it was carried out subsequent to that publication it is desired in this letter to draw the attention of those interested in India where biliary cirrhosis in the infant and the portal variety in the adult are prevalent diseases and possibly due to this error in diet. I have always regarded this as one of the pressing antenatal problems of the country.

Yours, etc.,

W. LEONARD FORSYTH, M.D., D.P.H.,
MAJOR, I.M.S. (Retd.),
Professor of Bacteriology.

UNIVERSITY OF CAIRO,
EGYPT,
18th January, 1937.

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Service Notes

APPOINTMENTS AND TRANSFERS

THE services of Lieutenant-Colonel D. H. Rai, M.C., are replaced at the disposal of the Government of the Punjab, with effect from the 15th January, 1937.

The services of Lieutenant-Colonel F. A. Barker, O.B.E., are replaced at the disposal of the Government of the Punjab, with effect from the date on which he assumes charge of his duties in the Jail Department.

The services of Major R. K. Misra are placed temporarily at the disposal of the Government of the United Provinces, with effect from the forenoon of the 30th December, 1936.

Major H. W. Mulligan, Officiating Assistant Director, Central Research Institute, Kasauli, is placed on foreign service under the Indian Research Fund Association to officiate as Director, Malaria Survey of India, with effect from the date on which he assumes charge of his duties.

In supersession of previous notification, in so far as it relates to Captain W. Scott, the services of that officer are placed permanently at the disposal of the Government of the Central Provinces, with effect from the 11th February, 1934, for confirmation in that province with effect from that date.

Captain E. A. O'Connor is temporarily employed to officiate as an Agency Surgeon, with effect from the forenoon of the 22nd October, 1936, and is posted to the North-West Frontier Province.

The services of Captain F. W. Allinson are placed temporarily at the disposal of the Government of Bengal, with effect from the afternoon of the 13th November, 1936.

The services of Captain M. S. Purvis are placed temporarily at the disposal of the Government of Burma, with effect from the forenoon of the 21st November, 1936.

The services of Captain S. T. Davies are placed temporarily at the disposal of the Government of Madras, with effect from the forenoon of the 2nd December, 1936.

Captain F. H. A. L. Davidson, on return from leave *ex*-India, is appointed as Civil Surgeon, Midnapore, *vice* Captain F. W. Allinson.

Captain E. H. Lossing, Second Resident Medical Officer, Presidency General Hospital, Calcutta, is appointed as First Resident Medical Officer of that institution, *vice* Dr. J. F. Coltman.

Captain F. W. Allinson, Civil Surgeon, Midnapore, on relief, is appointed as Second Resident Medical Officer, Presidency General Hospital, Calcutta, *vice* Captain E. H. Lossing.

LEAVE

Major-General Sir Cuthbert Allan Sprawson, *Kt.*, C.I.E., K.H.P., Director-General, Indian Medical Service, is granted leave, on average pay, from the 14th to the 28th February, 1937, preparatory to retirement.

Colonel N. M. Wilson, O.B.E., Inspector-General of Civil Hospitals, Central Provinces, is granted combined leave from the 17th February to the 15th September, 1937 (inclusive).

Colonel C. H. Reinhold, M.C., Inspector-General of Civil Hospitals, Punjab, is granted leave on average pay for 1 month and 16 days combined with leave on half-average pay for 4 months and 5 days, with effect from the 12th March, 1937, or date of availing.

Colonel C. E. Palmer, Inspector-General of Civil Hospitals and Prisons, Assam, is granted, preparatory to retirement, combined leave for 8 months, with effect from the afternoon of the 31st March, 1937.

Lieutenant-Colonel G. Covell, Officiating Director, Malaria Survey of India, on foreign service under the Indian Research Fund Association, is granted leave for 3 months and 23 days on average pay and for 4 months and 7 days on half-average pay, with effect from the 1st March, 1937, or subsequent date from which he may avail himself of it. His services are replaced at the disposal of the Director-General, Indian Medical Service, with effect from the date on which he proceeds on leave.

Major J. E. Gray, Civil Surgeon, Nasik, is granted leave on average pay for 6 months combined with leave on half-average pay for 4 months, with effect from the 15th April, 1937, or the subsequent date of availing.

PROMOTIONS

Majors to be Lieutenant-Colonels

G. V. Ram Mohan. Dated 20th October, 1936.
H. Williamson, O.B.E. Dated 17th December, 1936.
N. M. P. Dotivala, M.C. Dated 23rd December, 1936.

Captain to be Major

W. Scott. Dated 3rd September, 1936.

Lieutenants (on probation) to be Captains (on probation)

Dated 1st November, 1936

V. D. Gordon.
B. deBurca.
D. R. Nicol.
J. Morgan.

G. R. C. Palmer. Dated 14th November, 1936, with seniority from 1st May, 1936.
A. C. Taylor. Dated 10th November, 1936, with seniority from 1st May, 1936.
J. Revans. Dated 10th November, 1936, with seniority from 1st May, 1936.
T. Somerville. Dated 10th November, 1936, with seniority from 1st May, 1936.
L. M. Kelly. Dated 10th November, 1936, with seniority from 29th June, 1936.

To be Lieutenants (on probation)

31st October, 1936, with seniority 31st October, 1935

Michael Carson Lyndon Smith.
William Laurie.
Benjamin Morrill Wheeler.

31st October, 1936

Arthur Henry Walter Mitchell.
Charles Henry Bliss.
Brian James Doran (Secd.).
Robert Brocklesby Davis.
Francis MacDermot Byrn.
James Heaton Cater.
James Duncan Munroe (Secd.).

Notes

A NEW HERNIA DIRECTOR

By LEONARD LEY, M.B., B.C. (Cantab.)

I HAVE noticed always that in dividing the neck of a hernial sac there is, even with the winged hernia director, considerable difficulty in preventing the hernia sac curling round.

It occurred to me that if the director had wider wings, and particularly if a deep slot was cut on each side of the grooved director so that the wings could slide down over the neck of the sac, the intestine would be completely isolated from the field and unable to slide up and over the director.



I wrote to Messrs. Down Brothers and they have carried out my ideas most meticulously.

I and my colleagues have since had several opportunities of testing the instrument and it has fulfilled all my anticipations.

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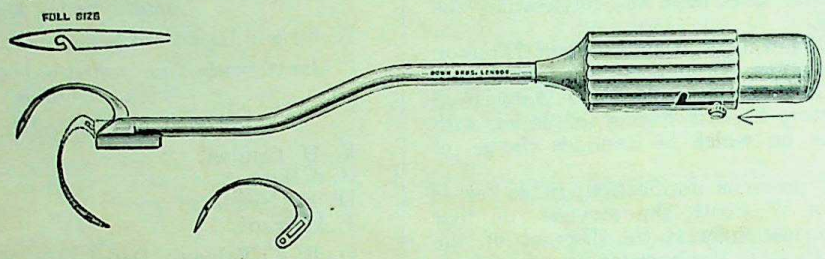
The accompanying illustration will demonstrate the modifications I have mentioned above.

I am very grateful to Messrs. Down Brothers for the care they have taken in carrying out my suggestions.

IMPROVED NEEDLE HOLDER FOR PROSTATECTOMY

By J. COSBIE ROSS, ch.M. (Liverp.), F.R.C.S. (Eng.)

THE widespread performance and success of Harris' operation for suprapubic removal of the prostate necessitates a periodic review and possible alteration of the armamentarium. Two criticisms of the needle holder appear to be justified. In the first place the



fact that the shaft is straight causes the operator's hand to obscure the operative field and to make it difficult to place the catgut in the appointed slot, especially if the operation is complicated by an adipose abdominal wall or narrow pelvis. The second difficulty is that the actual insertion of the needle may induce bleeding. Harris states that 'in order to avoid hæmorrhage from the needle puncture, it is important that the needle should not have a terminal sharp cutting edge. The needle should be sharpened only at the actual point. It is made of rustless steel, and must be kept sharp'. I do not consider that this precaution goes far enough. The needle commonly supplied with the Harris needle holder is flattened from side to side, and although there is no cutting edge, a slit-like opening is produced which may induce hæmorrhage when the needle is inserted.

In an attempt to obviate these two difficulties I have designed a needle holder which has two main characteristics. The shaft is angled about half-way between the needle and the holder. This permits a clear view of the needle both at the moment of insertion and immediately afterwards, by keeping the operator's hand out of the line of vision. The angle involves the pilot being made with a series of joints similar to a chain so as to pass the bend. Secondly, a round-bodied needle is provided. In order to eliminate the occasional annoyance of the catgut slipping out of the slot before being drawn through the tissues, a lateral slot that renders this accident impossible is provided with the round-bodied needle.

I have now used this needle holder in many cases and have found it very satisfactory. The angled shaft permits a good view of the depth of the wound and the round-bodied needle causes no additional hæmorrhage. Finally, the needle appears to bite readily into relatively tough tissue.

The needle holder was made for me by Messrs. Down Brothers Limited, 22a, Cavendish Square, W.1, who also suggested the lateral suture holding slot.

CALCIUM GLUCONATE AND IRON

FOR use in conditions which arise from the deficiency of calcium and iron, 'Tabloid' calcium gluconate and iron (effervescent) has been issued by Burroughs Wellcome and Co. One dissolved in a tumblerful of water makes an effervescent draught containing 20 grains of calcium gluconate and three grains of iron and ammonium citrate.

The product meets the physiological demand for calcium and iron in adults and children where a deficiency in the dietary supply is suspected, but where no actual clinical manifestations have been observed. Another suggested use of calcium gluconate and iron is during pregnancy and lactation to reinforce the dietary calcium and iron in order to cope with the demands for these elements by the developing fœtus or infant. It can be given with advantage over a long period to ensure an adequate supply of calcium for fœtal bone formation, and to replace the abnormal loss of iron during the pregnancy.

The dosage of 'Tabloid' calcium gluconate and iron in pre-natal cases is one product twice daily for a month then after the lapse of another month the treatment is resumed. An alternative method is to give one product daily over a period of several months. Where there is a marked deficiency of lime in the water of some districts, larger doses can be given with benefit. The dose for normal use is one or two products daily in a tumblerful of water.

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